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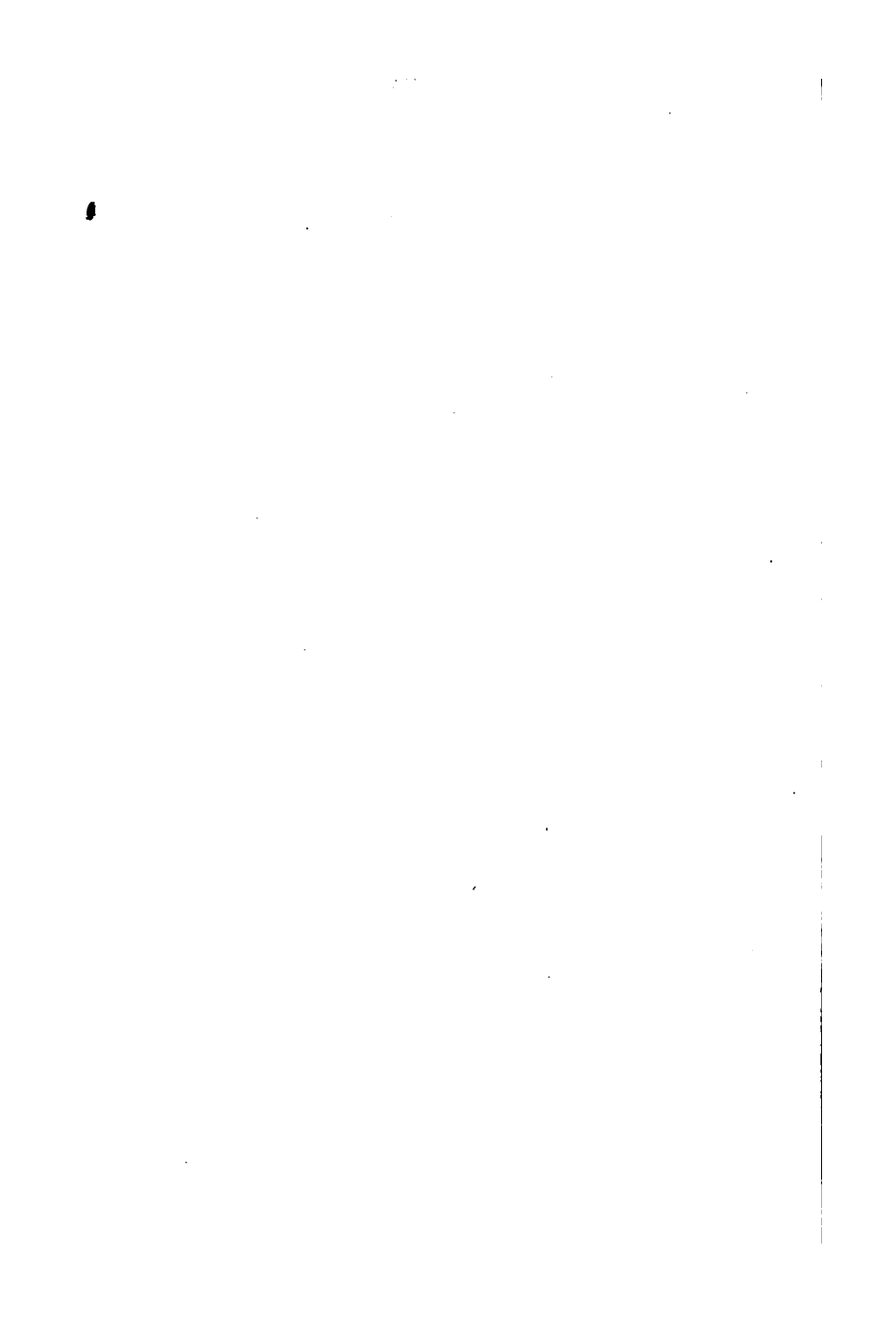
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34th THOUSAND.

CIVIL SERVICE
ARITHMETICAL
EXAMINATION PAPERS.

SEVENTH EDITION, ENLARGED.

BY

LAURENCE J. RYAN,

HEAD MASTER, CENTRAL MODEL TRAINING SCHOOLS, DUBLIN.

SANCTIONED BY THE COMMISSIONERS OF NATIONAL EDUCATION IN
IRELAND FOR USE IN THEIR SCHOOLS.

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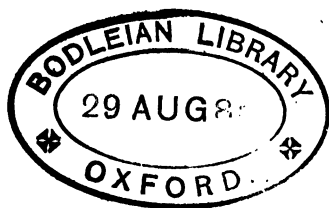
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PREFACE.

The principal aim of the Author is to supply a want long felt by Teachers in preparing Candidates for the Civil and Military Services, Banks, Solicitors' Apprenticeships, the College of Surgeons, and the Apothecaries' Hall. With one remarkable exception, the book requirements of such Students have been well supplied. At all Competitive and Qualifying Examinations each Candidate has got to work a paper on Elementary Arithmetic, comprising questions throughout what is usually known as Commercial Arithmetic. In Civil Service Examinations this paper contains from twenty-six to thirty-nine questions, and it is a matter of surprise that the ground which presented itself for supplying Students with a sufficiently varied assortment of such questions has not hitherto been occupied. The Author hopes that the issue of this Book will leave little to be desired on the point.

The exercises in the following pages may be divided into two classes—(a) Those given at "Civil Service" Examinations; (b) Those set at Competitive and Qualifying Examinations, but not by the Civil Service Commissioners. Relative to head (a)—The Civil Service Examiners give to Candidates six differently named papers. (1) "Elementary," embracing all the Rules of Arithmetic to Interest included. From twenty-six to thirty-nine such questions are given at every Civil Service Examination, whether competitive or qualifying, the latter including "Test Examinations." (2) Compound Addition, given also at all Examinations. (3) "Addition

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in Horizontal Lines," at Competitions for Class II. (4) Moderately Advanced Questions for Female Clerks in the Post Office. (5) "Advanced Arithmetic," given to Candidates for Class I. and II., Inspectorships of Schools, Army Control, &c. (6) "Advanced Arithmetic, including Mensuration," introduced for the first time in June, 1875, to Excise Candidates. Numerous examples under all these heads are afforded by this work.

Under heading (6) will be found several papers which have been already given at the following Examinations: (1) Bank of Ireland; (2) Solicitors' Apprentices; (3) College of Surgeons; (4) Apothecaries' Hall; all of which have taken important positions in our Educational contests.

Since the sanction of the Work by the Commissioners of National Education, the sale, through the Schools of Ireland, has been largely increased. As a consequence, the Author, anxious to keep the Book in harmony with the wants of the Irish National Teachers, has, in the successive Editions, kept pace with the requirements of the Results Programme. In this issue the Programme to come into operation in 1885 has been carefully kept in view.

For Sixth Class all the Elementary Papers will be found admirable practice. For Fifth Classes, Interest and Discount may be omitted; while for Fourth Class no better exercises can be given than those to be found throughout the "Elementary Papers" in the Compound Rules and Reduction. For all those classes particular attention is directed to the test questions on pages 62-66.

The "Addition of Money," intended for preparing for the Results Examination in National Schools, has been entirely re-written, so as to harmonize with the new programme (1885).

In teaching this important branch of Arithmetic, the following plan will be found to economize the Teacher's time. Place standing on the floor, or seated at the

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desks, and with slates or paper ready, the entire pupils of 3rd, 4th, 5th, and 6th classes. Then read for *all* the first five addends of any of the exercises from page 117 to page 120. The 3rd class then begins to add. Dictate two more addends for remaining classes: having done so, the 4th proceeds to find the sum. Three more lines are given to the two Fifths and Sixth, and two further to 5² and 6th classes. Lastly, three more addends are read for 6th class, which has now got fifteen addends, and is, therefore, ready to find the amount. The Author's experience of this method is that a School of 100 pupils may have its 3rd, 4th, 5th, and 6th classes exercised in the prescribed "Long Tot," say on alternate days, in five minutes, checking included. The advantage of being able to run *all* the prescribed classes through six exercises in half-an-hour, and by a single Teacher, or even a good Monitor, must strike any Teacher.

The Civil Service Examiners have recently set some difficult exercises in Scales of Notation, which from their novelty puzzle many Candidates. A paper of all the lately set questions is now given on page 70. (Solutions in Key).

As a Teacher of long experience, and thoroughly acquainted with the requirements of Candidates for public employment, the Author believes that any Student making himself well acquainted with all the papers of this Book cannot fail, if he present himself for examination, to receive very high marks in the Arithmetical portion of any Examination, Civil or Military; while Teachers of National Schools who use the "Elementary Papers" and "Addition of Money" in their classes, will have their Pupils at all times prepared in Arithmetic for the visits of the Board's officers.

In publishing the papers for Bank of Ireland, Solicitors' Apprentices, College of Surgeons, and Apothecaries' Hall, the Author believes he has done something towards smoothing the Arithmetical difficulties of these Examinations.

PREFACE.

Two suggestions are here offered for the guidance of those who use this Book. (1) All the work should be done on paper. (2) The Answers should never be referred to till the assigned task will have been completed.

As neatness, quickness, and accuracy are essential, they must be persistently aimed at; and it may be relied on that repeated references to the Answers are sure to engender slowness, and, what is worse, inaccuracy.

It is useless for any Student to present himself for examination before he is satisfied not only that he can work the various papers, but that he can do so neatly and within the prescribed time. The following is the time usually allowed to the arithmetical papers at Civil Service competitions:—

39 Elementary Questions,	from 2 to 2½ hours.
12 to 15 Advanced Questions	„ 2 to 2½ „
12 Separate Additions	„ ½ hour.
5 Averages and Percentages	„ 1 „

Of those anxious to obtain a thorough knowledge of the theory of Arithmetic, the “Principles of Arithmetic,” by Professor O’Sullivan, Ph.D., will be found to fulfil every expectation.

For further information on this, as well as every other subject connected with examinations for public appointments, the Student will do well to refer to Dr. Joyce’s invaluable work, “How to prepare for Civil Service Competition.”

* * * A Key to the Advanced Arithmetic and Percentages is now ready, price 1s. 6d.

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TABLES.

ARITHMETICAL TABLES.		
1.—MONEY.	MEASURES.	
	2.—CLOTH.	3.—SURVEYORS.
4 farthings 12d. 2s. 5s. 20s. = 10 <i>li.</i> = 4 <i>cr.</i> 21s.	2½ inches = 1 nail. 4 nls. = 1 quart. 4 qrs. = 1 yard. 3 qrs. = 1 Flemish ell. 5 qrs. = 1 English " 6 qrs. = 1 French "	7·92 inches = 1 link. 100 links = 1 chain. 80 chains = 1 mile. 10000 sq. links = 1 sq. chain. 100000 sq. links = 10 sq. chains = 1 acre. Surveyors use a chain 22 yds. long. It is composed of 100 parts linked together, hence the name link.
MEASURES.		
4.—LENGTH	5.—SURFACE.	6.—SOLIDITY.
12 lines = 1 inch. 12 in. = 1 foot. 3 ft. = 1 yard. 5½ yds. = 1 perch, Statute. 6½ " = 1 " Irish. 7 " = 1 " " 40 perches = 1 furlong. 8 furs. = 1 mile. 3 miles = 1 league.	144 sq. inches = 1 sq. foot. 9 " ft. = 1 " yard. 804 " yds. = 1 " perch, Statute. 391·16 sq. yds. = 1 " " Cunningham 48 sq. yds. = 1 " " Irish. 40 perches = 1 rood. 4 roods = 1 acre. 640 acres = 1 sq. mile. 4840 sq. yds., 6260 sq. yds., and 7840 sq. yds. = respectively, an acre Statute, Cunningham, and Irish. A Statute acre : an Irish acre :: 121 : 100. Statute ac. : a Cunningham ac. :: 484 : 625. Statute measure is also called English measure. Plantation measure is another name for Irish. Cunningham measure is another name for Scotch	1728 cubic inches = 1 cubic foot. 27 " ft. = 1 " yd. 8 " yds. = 1 " fathom. 7.—LIQUID AND DRY. 4 gills or muggins = 1 pint. 2 pints = 1 quart. 4 quarts = 1 gallon. 2 gallons = 1 peck. 4 pecks = 1 bushel. 8 bushels = 1 quarter. 5 quarters = 1 load. 3 bushels = 1 sack { Coal 12 sacks = 1 chaldron { measure. 1 barrel of beer = 86 gallons. 1 hoghead do. = 64 " " 1 hoghead of } = 63 " " wine or spirits } 1 pipe = 2 hogheads.
IN BOTH LENGTH AND SURFACE		

TABLES.

ARITHMETICAL TABLES—Continued.		
WEIGHTS.		
8.—Avoirdupois.	9.—Troy.	12.—Time.
27 $\frac{1}{4}$ Troy grains = 1 dram.	24 grains = 1 pennyweight.	
16 drams = 1 ounce.	20 dwts. = 1 ounce.	60 seconds = 1 minute.
16 ozs. = 1 pound.	12 ozs. = 1 lb.	60 minutes = 1 hour.
14 lbs. = 1 stone.	5760 grains = 1 lb.	24 hours = 1 day.
2 sts. = 1 qr.	Gold, silver, platinum, and the less	7 days = 1 week.
4 qrs. = 1 cwt.	valuable gems, are weighed by Troy	265 days = 1 social year.
20 cwt. = 1 ton.	weight. In philosophical experiments	365 days = 1 leap year.
7000 Troy grains = 1 lb.	also this weight is used.	365 days 5 hrs. } = 1 solar year.
		48 mins. 49 $\frac{1}{2}$ } = 1 lunar month.
		27 days 7 hrs. 43' = 1 lunarmonth.
		29 days 12 hrs. 44' = 1 synodical "
The ratio of the Avoirdupois lb. to the Troy lb. is 7000 : 5760 or 175 : 144. It should be remembered that the ounce Troy contains 480 grains, while the ounce Avoirdupois contains only 437$\frac{1}{2}$ grains. Hence, as the two ounces are of different weights, the ratio between the two pounds cannot be 16 : 12, an error into which people sometimes fall when engaged in reducing one of those weights to the other.		
10.—APOTHECARIES.	11.—DIAMONDS, &c.	
20 grains = 1 scruple.	3 $\frac{1}{2}$ grains = 1 carat.	
8 scruples = 1 dram.	151 $\frac{1}{2}$ carats = 1 oz. Troy.	
8 drams = 1 oz.		
12 ozs. = 1 lb.		
Used only in compounding. The lb., oz., and gr. are same as in Troy weight. An attempt has been made by the Medical Council to substitute the Avoirdupois lb., but it does not seem likely to be very successful.		
A leap year occurs every fourth year, except the year that completes a century. Then, unless the two digits which number the century are exactly divisible by 4, the year is not a leap year. Thus, the year 2000 will be a leap year, but the year 1900 will not.		
In ordinary cases any year which is expressed by a number exactly divisible by 4 is a leap year. Hence 1872 represents a leap year.		

SET 1.

1. Reduce 78,463,987 inches to miles, furlongs, &c.
 2. Subtract 13 qrs. 2 bushels 2 pecks from 20 qrs. 1 peck.
 3. Multiply 6 acres 3 roods 10 perches by 278.
 4. Divide 476 lbs. 10 ozs. 12 dwts. by 39.
-

5. Add $3\frac{7}{8}$, $1\frac{1}{4}$, $\frac{7}{36}$, and $9\frac{1}{3}$.
 6. Subtract $5\frac{3}{8}$ from $7\frac{1}{8}$.
 7. Multiply $4\frac{1}{4}$ by $2\frac{1}{2}$.
 8. Divide $9\frac{3}{4}$ by $2\frac{1}{2}$.
-

9. Add 43·006, ·73, ·0006, and 4.
 10. Subtract 7·006 from 10·03.
 11. Multiply 7·364 by ·000967.
 12. Divide, to five places of decimals, 73·06 by 179·874.
 13. Express 7 stones 10 lbs. as the fraction of a cwt.
 14. Reduce 5 furlongs 3 perches to the decimal of a mile.
-

15. If 3 lbs. 5 ozs. of tea cost 13s. 3d. what is that for 2 stones 4 lbs?

16. Find (by Practice) the loss of a creditor who receives only 13s. 4d. in the pound, on a debt of £2697 10s. 0d.

17. Find (also by Practice) the rent of 14 acres 3 roods 12 perches of land at £2 18s. 10½d. per acre.

18. In what time will 14 horses plough a piece of land which 30 mules can plough in 12 days, the work of seven horses being equivalent to that of ten mules?

19. Find the amount of £376 10s. 8d. lent for $5\frac{1}{2}$ years at $3\frac{1}{2}$ per cent per annum, Simple Interest.

SET 1.

20. Find the compound interest on £3,679 10s. 7d. for 3 years, at $5\frac{1}{2}$ per cent. per annum, neglecting fractions of a penny.

21. What is the present value of a bill of £678 13s. 10d. drawn for 15 months, at 6 per cent. per annum (Simple Interest)?

22. In what time would £756 amount to £831 12s. at 4 per cent. per annum, Simple Interest?

23. What is the cost of 4 bushels and 3 pecks of oats at 27s. 9d. for 1 qr. 2 pecks?

24. Reduce 18 acres 10 perches to square yards.

25. How many cubic yards, feet, &c., in 47396484 cubic inches?

26. Add $5\frac{7}{8}$, $3\frac{1}{11}$, $4\frac{3}{8}$, and $1\frac{2}{5}$.

27. Subtract $11\frac{2}{3}$ from $20\frac{1}{5}$.

28. Multiply together $7\frac{2}{3}$, $1\frac{2}{7}$, and $4\frac{3}{8}$.

29. Divide $6\frac{2}{11}$ by $2\frac{3}{8}$.

30. What fraction is 2 yards 1 qr. of 5 yards 1 nail?

31. Add 7.89, 46.306, .000674, .001.

32. Subtract 7.006 from 101.3.

33. Multiply 74.16 by 3.897.

34. Divide, to 7 places, 78.467 into 47.9.

35. What decimal of 2 miles is 3 furlongs and 10 perches.

36. In 3476984 square inches, how many acres, &c.?

37. Find the value of $\frac{2}{3}$ of a crown + $\frac{1}{4}$ of a pound + $\frac{1}{8}$ of a guinea. Express the Answer in £ s. d.

38. Multiply 5.69 by .0125, and express the answer as a decimal.

39. Divide 2.94 by .481, and express the answer as a decimal.

EXAMINATION PAPERS.

SET 2.

1. In 9,473,284 ozs. how many tons, cwts., &c. ?
 2. Reduce 7 acres 3 roods 10 perches to square feet.
 3. In 7,849,643 pints how many loads, qrs., bushels, &c. ?
 4. What is the price of 3 barrels 10 stone of wheat, if 18 barrels cost £22 13s. 9d. (20 stones to the barrel) ?
 5. If 18 men do a piece of work in 12 days, how long will 24 men take to do it ?
 6. Add $7\frac{3}{10}$, $4\frac{8}{15}$, $6\frac{2}{3}$, and $\frac{9}{10}$.
-

7. From $11\frac{2}{3}$ take $3\frac{1}{4}$.
 8. Multiply together $11\frac{1}{3}$, $2\frac{1}{4}$, $3\frac{1}{2}$.
 9. Divide $17\frac{2}{3}$ by $4\frac{2}{3}$.
 10. Find the simple interest on £376 18s. 10d. for $3\frac{1}{2}$ years at $4\frac{1}{2}$ per cent. per annum.
 11. What sum lent (Simple Interest) at 4 per cent. per annum will amount to £748 10s. in $3\frac{1}{2}$ years ?
 12. Find the difference between Simple and Compound Interest on £848 10s. 6d. for 3 years at 4 per cent., neglecting fractions of a penny.
 13. At what rate per cent. per annum (Simple Interest) will £478 10s. amount to £556 5s. $1\frac{1}{2}$ d. in 5 years ?
-

14. Add 17·00013, 860, ·0007, 4·009.
15. Subtract 10·40017 from 11·3.
16. Multiply 17·006 by ·0993.
17. Divide to four places of decimals ·078 into 34·506.
18. Reduce 2 qrs. 7 lbs. to the fraction of 1 ton.
19. Reduce 2 pecks 1 gallon to the decimal of a bushel.

SET 2.

20. Subtract 19 years 40 weeks 6 days from 24 years 3 weeks 4 days.

21. What is the cost of $38\frac{1}{2}$ yards of cloth at $1\frac{1}{2}$ s. per yard?

22. Find the price of a yard of silk, when $18\frac{1}{2}$ yards cost £21 4s. 8d.

23. At £2 9s. 6d. for 5 cwt. 1 qr. 6 lbs. of flour, what is the price of 13 stones $2\frac{1}{2}$ lbs.?

24. If 24 printers can print a work in 4 days, how many printers can do the same work in 3 days?

25. What sum of money will be earned by 18 women in 30 days, if 15 men in 12 days earn £24, the wages of 2 men being equal to that of 3 women?

26. In what time will 18 horses plough 30 acres, which 10 horses can plough in 9 days?

27. Find the value of $\frac{1}{12} + 1\frac{1}{2} + 3\frac{1}{2} + 14\frac{1}{2}$.

28. From $9\frac{1}{2}$ take $3\frac{1}{2}$.

29. Multiply $3\frac{1}{2}$ by $17\frac{1}{2}$.

30. Divide $16\frac{1}{2}$ by $1\frac{1}{2}$.

31. What fraction of £2 8s. $11\frac{1}{2}$ d. is 9s. $9\frac{1}{2}$ d.?

32. Find what decimal of 3 miles 10 perches is 1 mile 3 furlongs?

33. Add 17.0406, 173.00009, 3.5, and 1,000.

34. From 10.006 take 7.09306.

35. Find the product of 7.34, 6.9, and .764.

36. Divide 17.39 into 6.007 to 4 decimal places.

37. Add together £ $\frac{1}{2}$, $\frac{1}{4}$ s guinea, and $\frac{1}{2}$ crown. Express the Answer in £ s. d.

38. Find (by Practice) the price of 18 yards 3 qrs. 2 nails of cloth at 17s. $10\frac{1}{2}$ d per yard.

39. Find (also by Practice) the assets of a bankrupt who can pay 13s. 9d. in the pound on a debt of £2,764 10s. 6d.

SET 3.

1. Multiply $4.7\bar{5}$ by $.0015$, and express the answer as a decimal.

2. Divide $3.8\bar{7}$ by $49.85714\bar{2}$, and express the answer as a decimal.

3. From £78,064 11s. 6½d. take £19,327 13s. 2½d.

4. Multiply £7,049 11s. 6½d. by 89.

5. Divide 1,706 acres 3 roods 10 perches by 365.

6. Divide £47,698 13s. 1½d. by 309.

7. In 704,306 grains of silver how many lbs., ozs., &c.

8. If a man walk $13\frac{1}{2}$ miles in $4\frac{1}{2}$ hours, how long will he be walking $28\frac{1}{2}$ miles?

9. Find (by Practice) the dividend on £17,436 10s. 0d., at 12s. 7d. per £.

10. Find the simple interest on £7,634 10s. 6d. for 4 years at $3\frac{1}{2}$ per cent. per annum.

11. In 2,746,984 inches, how many miles, furlongs, &c.?

12. If, when wheat is 50 shillings per quarter, the 5-penny loaf weighs 4 lbs., how much must be paid for 20 lbs. of bread when wheat is 40 shillings per quarter?

13. Add together $7\frac{1}{8}$, $4\frac{2}{3}$, $5\frac{1}{12}$, and $\frac{1}{2}$.

14. Subtract $11\frac{1}{2}$ from $20\frac{1}{4}$.

15. Multiply together $10\frac{2}{3}$, $1\frac{1}{2}$, $\frac{2}{3}$, and $2\frac{1}{4}$.

16. Divide $12\frac{1}{2}$ by $3\frac{1}{4}$.

17. What fraction of $1\frac{1}{2}$ tons is 5 cwt. 1 qr. 12 lbs.?

18. Add 4.7, 16.304, 1.7006, and .000094.

19. Subtract 18.63941 from 20.003162.

20. Multiply together 13.06, 4.1, and 3.732.

21. Divide 17.463 by .00743 to 4 places of decimals.

22. Divide 1000 acres 1 rood 32 perches by $17\frac{1}{2}$.

SET 3.

23. Find the simple interest on £472 10s. 0d. for $4\frac{1}{2}$ years, at $8\frac{1}{2}$ per cent. per annum.

24. At what rate per cent. per annum (Simple Interest) will £362 10s. 0d. become £438 12s. 6d. in $5\frac{1}{4}$ years?

25. Neglecting fractions of a penny, what will £493 12s. 10d. amount to in 3 years, at $4\frac{1}{2}$ per cent per annum, Compound Interest?

26. Find (by Practice) the cost of 7,894 sheep, at £2 12s. $9\frac{1}{2}$ d. each.

27. If 19 men cut down 20 acres of corn in ten days, how many acres can be cut down by 24 men in $6\frac{1}{2}$ days?

28. From what sum will £387 11s. 3d. be produced as amount in $3\frac{1}{2}$ years, at $5\frac{1}{2}$ per cent. per annum, Simple Interest?

29. Add together $17\frac{4}{11}$, $8\frac{7}{8}$, $14\frac{2}{3}$, $\frac{11}{2}$, and $9\frac{4}{12}$.

30. Subtract $18\frac{2}{5}$ from $24\frac{1}{2}$.

31. Multiply $11\frac{1}{2}$ by $1\frac{1}{2}$.

32. Divide $17\frac{3}{8}$ by $2\frac{3}{4}$.

33. What fraction of 1 lb. 12 grains is 5 ozs. 5 grains (Troy Weight)?

34. Reduce to its simplest form $\frac{(6\frac{1}{2} + 7\frac{1}{2}) \times 1\frac{1}{2}}{\frac{2}{3} \text{ of } 3\frac{3}{4}}$.

35. Add together 17·439, 184·706032, 400, 1·74946, and 0·406739.

36. Subtract 147·392674 from 200·0324.

37. Multiply 147·9468 by ·07836.

38. Divide 197·369 by 2047·4 to four places.

39. Add together ·125 acres, 7·45 roods, and 184 perches, and express the Answer in acres, roods, and perches.

SET 4.

1. In 54,694,784 square inches how many acres, roods, &c.?
2. How many pints in 13 loads 2 bushels 3 pecks?
3. Find (by Multiplication) the cost of $78\frac{1}{2}$ yards of silk at 18s. 6d. per yard.
4. Divide $83\frac{1}{2}$ into 40 tons 3 cwt. 2 qrs. Express the Answer in cwts. qrs. and lbs.
5. Find the difference between 3 tons 3 qrs. and 5 tons 2 qrs. 12 lbs.
6. In 540 yards how many ells? Reduce 3 miles 2 furlongs 4 yards to fathoms.
7. Find (by Practice) the cost of 13 tons 17 cwt. 2 qrs., at £7 13s. 10½d. per ton.

-
8. Add together $\frac{2}{3}$, $1\frac{5}{12}$, $2\frac{7}{20}$, and $3\frac{1}{5}$.
 9. Subtract $5\frac{7}{12}$ from $10\frac{1}{12}$.
 10. Multiply together $7\frac{1}{12}$, $3\frac{1}{2}$, $1\frac{1}{3}$, and $\frac{2}{3}$.
 11. Divide $1\frac{1}{10}$ by $2\frac{7}{10}$.
 12. What fraction of 3 yards 2 nails is 2 yards 2 qrs.?

-
13. Add together 4.006, .000013, 73.4, and 690.14.
 14. Subtract 18.547609 from 20.10463.
 15. Multiply together 14.736, .04, and 3.7.
 16. Divide 7.49 by .00063.
 17. Reduce 3 cwt. 2 qrs. 8 lbs. to the decimal of 1 ton 2 cwt true to four places.

-
18. What is the cost of 13 yards 2 nails of cloth, if 14 ells 3 qrs. cost £3 1s. 3d.?
 19. Find the number of horses that will plough $15\frac{1}{2}$ acres, when 15 horses will plough $11\frac{1}{2}$ acres?
 20. Find the cost of 17 acres 3 roods at £5 10s. 10d. for 2 acres 1 rood 20 perches.

SET 4.

21. How many days will be required by 14 men to copy 140 sheets of writing, when 15 boys can do 100 sheets in 20 days, 3 men being the equivalent of 5 boys?

22. Find the amount of £780 10s. 6d. for $4\frac{1}{2}$ years at 3 per cent. per annum Simple Interest.

23. What sum now lent at $3\frac{1}{2}$ per cent. per annum will amount to £358 10s. in six years?

24. At what rate per cent. per annum will £788 15s. produce as interest £252 8s. in $4\frac{1}{2}$ years?

25. Find the compound interest on £374 16s. 10d. in 3 years, at 4 per cent. per annum, neglecting fractions of a penny.

26. Find (by Practice) the amount of net income from an estate paying 3s. 10 $\frac{1}{2}$ d. land tax in every pound, the gross rental being £7,896 10s.

27. Add $4\frac{1}{2}$, $11\frac{1}{2}$, $7\frac{1}{2}$, and $\frac{1}{2}$.

28. Subtract $3\frac{1}{2}$ from $10\frac{1}{2}$.

29. Multiply $14\frac{1}{2}$ by $\frac{1}{2}$.

30. Divide $7\frac{1}{2}$ by $4\frac{1}{2}$.

31. Add together $\frac{2}{3}$ acre, $\frac{2}{3}$ rood, and $\frac{2}{3}$ perch, exhibiting the Answer in roods and perches.

32. Which is the greatest and which least of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$?

33. What fraction of 4 lbs. 3 ozs. 10 dwts. 5 grains is 6 ozs. 3 dwts. 15 grains?

34. Add together 7.4, .36, .00007, and .365.

35. Subtract 1.04 from 10.4.

36. Multiply 36.7 by .007.

37. Divide 7.4 by .0746 to four places of decimals.

38. Find the value of .75 crowns + .5 guineas + £.25 Express the Answer in shillings and pence.

39. From .425 lbs. Troy take .25 lbs. Avoirdupois, expressing the answer in ozs., dwts., &c.

SET 5.

1. Reduce 78 acres 3 roods 10 perches to square yards.
 2. How many loads, bushels, &c., in 70,504,319 pints?
 3. Multiply 3 lbs. 7 ozs. 8 dwts. 13 grains by 45.
 4. Divide 786 tons 3 qrs. by $78\frac{1}{2}$.
 5. What is the cost of 78 stones 11 lbs. of tea if 1 cwt. cost £20 6s. 0d?
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6. What sum lent at $5\frac{1}{2}$ per cent. per annum for $3\frac{1}{2}$ years will amount to £387 11s. 3d.?

7. Find the simple interest on £756 10s. 6d. lent for 4 years at $5\frac{1}{2}$ per cent. per annum.

8. Find the difference between the simple and compound interest of £386 10s. 0d. for 3 years at 4 per cent. per annum, neglecting, in both cases, fractions of a penny.

9. In what time will £478 10s. $1\frac{1}{2}$ d. become £521 11s. $5\frac{1}{2}$ d. at 4 per cent. per annum, Simple Interest?

10. How many lbs. of tea can be bought for 51 guineas, if 170 lbs. are worth £17 17s. 0d.?

11. In how many days will 15 labourers dig a trench which 20 labourers can dig in 16 days, the former working 8 hours a day, the latter 9 hours?

12. Add together $14\frac{1}{10}$, $6\frac{2}{10}$, $3\frac{1}{10}$, $\frac{1}{10}$.

13. Subtract $5\frac{1}{2}$ from $8\frac{1}{4}$.

14. Multiply together $7\frac{1}{2}$, $1\frac{1}{2}$, $\frac{1}{2}$, and $1\frac{1}{2}$.

15. Divide $\frac{1}{4}$ by $1\frac{1}{2}$.

16. Multiply $18\frac{1}{2}$ guineas by $3\frac{1}{2}$, expressing the result in pounds, shillings, pence, and fraction of a penny.

17. How many farms of 76 acres 3 roods 14 perches can be made out of an estate containing 1,459 acres 3 roods 26 perches?

SET 5.

18. Find (by Practice) what is the cost of 7,869 sheep at £3 16s. 10d. per sheep.

19. Find (also by Practice) the assets of a bankrupt who can pay 5s. 9d. in the pound on a debt of £7,846 10s. 0d.

20. Add together 78006, 4783, 16476047, 3064, 4736.

21. Subtract 173 from 100003.

22. Multiply 17406 by 17406.

23. Divide 00063 into 1, to 3 places of decimals.

24. Reduce 5 perches to the decimal of 3 furlongs 5 perches.

25. Reduce $1\frac{1}{2}$ to the decimal of $1\frac{1}{2}$ to 4 places of decimals.

26. What is the cost of flooring a room 24 feet by 18 feet at 4s. 10d. per square yard?

27. Add together $\frac{1}{2}$, $1\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{8}$, $1\frac{1}{2}$.

28. Subtract $\frac{1}{2}$ from $\frac{3}{4}$.

29. Multiply $2\frac{1}{2}$ by $\frac{1}{15}$.

30. Divide $3\frac{1}{2}$ by $7\frac{1}{2}$.

31. If the 7d. loaf weighs $3\frac{1}{2}$ lbs. how many ozs. of bread can I purchase for $1\frac{1}{2}$ pence?

32. If a cask of whiskey containing 9 gallons cost £7 13s. 0d. what is the worth of a vessel containing 10 gallons, of which 4 parts are whiskey and 1 water?

33. Find (by Practice) the price of 2 lbs. 3 ozs. 7 dwts. of silver at 5s. 6d. per oz.

34. If 8 men in 5 days do a piece of work, how many days will it take 7 men to finish a piece 3 times as large, if they work half as much longer each day?

35. Find the cost of 18 gallons 3 quarts of rum at £1 6s. 0d. for 3 gallons 1 quart.

36. Add together 743, 6987, 00067, and 4.

37. Subtract 1746987 from 20003.

38. Multiply 569 by 0125, and express the answer as a decimal.

39. Divide $29\frac{1}{2}$ by 481, and express the answer as a decimal.

SET 6.

1. In 17,416,385 perches how many leagues, miles, &c.?
 2. Find the simple interest on £786 13s. 10d. for four years at 6 per cent. per annum.
 3. Find the difference between the simple and compound interest on £378 16s. 10d. for 3 years, at $2\frac{1}{2}$ per cent. per annum, neglecting, in both cases, fractions of a penny.
 4. Reduce 17 tons 14 cwt. 3 qrs. 10 lbs. to pounds.
 5. What is the price of 13 barrels 4 stones 7 lbs. of flour at 10s. $11\frac{1}{4}$ d. for $7\frac{1}{2}$ stones?
 6. Find (by Practice) the price of 4,316 sheep at £1 18s. $10\frac{1}{4}$ d. per sheep.
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7. In what time will 10 reapers cut down a field of corn which 18 reapers can cut down in 12 days?
 8. Find (by Practice) the duty on 3,764 gallons of rum at 7s. $10\frac{1}{4}$ d. per gallon.
 9. In what time will £4,762 10s. amount to £5,381 12s. 6d. at $3\frac{1}{2}$ per cent. per annum (Simple Interest)?
 10. How much money may be earned by 22 men in 12 days if 29 women earn £14 10s. 0d. in 15 days, the work of 8 women being equal to that of 3 men?
 11. Add $2\frac{7}{8}$, $13\frac{2}{5}$, $4\frac{3}{5}$, and $\frac{1}{2}$.
 12. Subtract $1\frac{1}{2}$ from $11\frac{3}{4}$.
-

13. Multiply together $\frac{7}{8}$, $13\frac{2}{5}$, $2\frac{3}{5}$, and $1\frac{1}{4}$.
14. Divide $7\frac{1}{8}$ by $4\frac{1}{2}$.
15. Express 13 stones 8 lbs. as the fraction of 2 cwt. 1 lb.
16. Reduce to a simple fraction $\frac{\frac{2}{3} + 1\frac{1}{2}}{\frac{1}{4} + 2\frac{1}{4}}$
17. Find the price of a solid block of marble in the form of a cube, each of whose sides is 4 feet, at 2s. $9\frac{1}{4}$ d per cubic foot.
18. A floor contains 633 square feet 135 inches, and is 26 feet 9 inches long, find the breadth.

SET 6.

19. In 7846934 square inches how many acres, roods, &c.
20. Reduce 78 guineas 13s. 10½d. to farthings.
21. Add together 78·4736, ·39847, 1·0006, and ·078434c.
22. Subtract 17·36009 from 20·0003.
23. Multiply 34·736 by ·00073.
24. Divide 13·006 by ·00074.
25. Express 4 oz. 2 dwts. as the decimal of a pound.

26. Find the simple interest on £376 12s. 6d. for 4 years at 4½ per cent. per annum.
27. What sum lent at Simple Interest for 3½ years at 4 per cent. per annum will produce £456?
28. Multiply 3 acres 2 roods 14 perches by 7½.
29. Divide £1,000 equally between 29 people.
30. How divide £73 10s. 6d. between 5 persons, one getting £3 10s. 6d. more than each of the others.

31. Add together $\frac{1}{2}$, $\frac{1}{3}$, $1\frac{1}{4}$, and $\frac{1}{5}$.
32. Subtract $1\frac{1}{2}$ from $2\frac{1}{2}$.
33. Multiply $1\frac{1}{2}$ by $\frac{1}{3}$.
34. Divide $1\frac{1}{2}$ by $8\frac{1}{2}$.
35. Express $\frac{1}{2}$ of a pound as the fraction of a guinea.
36. Reduce 3 acres 2 roods 20 perches to perches.

37. In 36,794,867 inches how many fathoms?
38. In 367,896 ells how many yards?
39. How many suits of clothes, each containing 2 yards 1 quarter, can be made from a piece containing 36 yards.

SET 7.

1. Multiply 2.997 by .016, and express the answer as a decimal.
 2. Divide .748 by .296, and express the answer as a decimal.
 3. What is the compound interest of £376 10s. 4d. for 3 years at 4 per cent. per annum, neglecting fractions of a penny?
 4. Find (by Practice) the price of 386 barrels of oats at 18s. 6½d. per barrel.
 5. Find the cost of papering a room 20 feet long, 16 feet broad, and 12 feet high, at 1s. 3½d. per square yard.
 6. If 40 donkeys draw from a quarry 3,000 loads of stones in 20 days, in how many days will 15 mules do the same work, the work of 5 donkeys being equal to that of 3 mules.
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7. If 7 acres 3 roods 10 perches cost £30 19s. 6d. what will 3 acres cost?
 8. Reduce 78 qrs. 3 lbs 10 oz. to ounces.
 9. In 4789643 gallons how many loads, quarters, &c.?
 10. How many small cubes of 2 inches in each side may be cut from a cubical block, 3 feet 4 inches being the length of each side?
 11. A cistern capable of containing 1,080 cubic feet is 12 feet long and 9 feet broad, find its height.
 12. Multiply 3 lbs. 10 ozs. 6 drams by 11.
-
13. Divide 14 tons 3 cwt. 1 qr. by 11.
 14. Reduce 3 miles 2 furlongs 4 yards to fathoms.
 15. Add together $3\frac{4}{12}$, $4\frac{7}{10}$, $1\frac{1}{2}$, and $\frac{1}{3}$.
 16. Subtract $7\frac{1}{2}$ from 10.
 17. Divide $6\frac{1}{2}$ by $1\frac{1}{4}$.
 18. Multiply £3 10s. 6d. by 18½.
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19. Divide 17 cwt. 3 qrs. 14 lbs. by 1½.
 20. What fraction of £1 is $\frac{1}{4}$ of 2s. 6d.?

SET 7.

21. Multiply $1\frac{2}{3}$ by $5\frac{1}{2}$.
22. If 17 men earn £20 10s. 10d. what will 33 men earn?
23. Find (by Practice) the loss to the creditors in the case of a bankrupt who owed £17,246 10s. 0d., and can pay 13s. 9d. in the £.
24. Find the amount of £370 for $2\frac{1}{2}$ years at 3 per cent. per annum, Simple Interest.

25. What is the compound interest on £760 10s. 0d. for 3 years at 4 per cent. per annum, neglecting fractions of a penny?
26. What sum in 3 years at $2\frac{1}{2}$ per cent. per annum will amount to £215?
27. At what rate per cent. per annum will an amount of £417 4s. 0d. be attained by a principal of £372 10s. 0d. in 8 years?
28. From $18\frac{1}{2}$ subtract $10\frac{1}{2}$.
29. Multiply $3\frac{1}{2}$ by $1\frac{1}{2}$.
30. Divide $7\frac{1}{2}$ by $2\frac{1}{2}$.
31. Divide £15 11s. 7d. between 5 men, giving £1 6s. 1d. to one and £1 5s. 6d. to another, more than to each one of the remaining three.

32. Add together 100·01, 1·0001, 100·00034, and ·743.
33. From 100·406 take ·7009.
34. Multiply together 5·4, 7·3, and ·5.
35. Divide 17·346 into ·17346.
36. Add together $\frac{1}{2}$ tons, $2\frac{1}{2}$ cwt., and $29\frac{1}{2}$ lbs., exhibiting the Answer in tons, cwts., qrs., &c.
37. Express four half guineas as the fraction of £5.
38. From 7 lbs. 6 ozs. 13 dwts. 7 grains subtract 9 ozs. 10 dwts. 12 grains.
39. Find the price of 3 stones $1\frac{1}{2}$ lbs. of butter at £4 16s. 0d. for 2 qrs. 16 lbs.

SET 3.

1. Add together $13\frac{1}{4}$, $27\frac{2}{3}$, $5\frac{1}{5}$, $14\frac{1}{3}$, and $\frac{7}{8}$.
 2. Subtract $11\frac{2}{3}$ from $17\frac{1}{2}$.
 3. Multiply together $8\frac{2}{3}$, $1\frac{1}{2}$, and $2\frac{1}{3}$.
 4. Divide $13\frac{1}{2}$ by $\frac{2}{3}$.
 5. Express $1\frac{1}{2}$ as the fraction of $6\frac{2}{3}$.
 6. Express $\frac{2}{3}$ of $1\frac{1}{2}$ roods as the fraction of $\frac{2}{3}$ acres
-

7. Add together .00749, 136.3946, 17.406, 1.7398469, and 402.
 8. Subtract 18.006397 from 201.3406.
 9. Multiply 93.7406 by .000639.
 10. Divide 73.649 into .84974 to 5 decimal places.
 11. Express .75 of £7 as the decimal of 3.125 guineas.
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12. Find the compound interest of £389 12s. 6d. for 4 years at 3 per cent. per annum, neglecting fractions of a penny.
 13. Reduce 746,984 square feet to acres, roods, &c.
 14. Reduce 47 loads 2 qrs. 1 peck to pints.
 15. In 786,435 inches how many ells, quarters, &c.?
 16. Find the simple interest of £436 18s. 6d. for $3\frac{1}{2}$ years at 4 per cent. per annum.
 17. If $17\frac{1}{2}$ acres of land cost £43 15s. 0d. what will $5\frac{1}{2}$ acres cost?
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18. Add together $15\frac{1}{2}$, $10\frac{1}{3}$, $3\frac{1}{4}$, $\frac{1}{5}$, and $9\frac{1}{6}$.
19. Subtract $9\frac{2}{3}$ from $17\frac{1}{2}$.
20. Multiply together $9\frac{1}{2}$, $7\frac{1}{3}$, and $\frac{1}{4}$.
21. Divide $14\frac{1}{2}$ by $\frac{3}{4}$.

SET 8.

22. Express 2 English miles as the fraction of 3 Irish miles (lineal).
23. Add together 6·473, 184·94, 736·000947, 350, and 17·69147.
24. Subtract 147·047369 from 200·04231.
25. Multiply together 4·93, 13·637, and ·12.
26. Divide ·004739 by ·0648 to 5 decimal places.
27. How many yards of paper $2\frac{1}{2}$ feet wide, will be required to paper a room 24 feet long, 16 feet wide, and 12 feet high ?
-

28. Find (by Practice) the cost of 376 yards of silk at 19s. $10\frac{1}{2}$ d. per yard.
29. Find the amount of £378 10s. 6d. for 3 years at $4\frac{1}{2}$ per cent. per annum, Simple Interest.
30. What is the amount of £4,752 10s. for $\frac{1}{2}$ years at $3\frac{1}{2}$ per cent. per annum, Simple Interest.
31. In what time will £150 become £186 at 6 per cent. annum, Simple Interest ?
32. What principal will produce £686 13s. 6d. in $3\frac{1}{2}$ years at 6 per cent. per annum, Simple Interest.
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33. Add together $\frac{1}{2}$, $1\frac{1}{2}$, $1\frac{1}{2}$, and $\frac{1}{2}$.
34. Subtract $1\frac{1}{4}$ from $3\frac{1}{4}$.
35. Multiply $7\frac{1}{2}$ by $\frac{1}{4}$.
36. Divide $8\frac{1}{2}$ by $3\frac{1}{2}$.
37. Find the dividend on £7,864 at 3s. $10\frac{1}{2}$ d. in the £.
38. How much cloth may be had for £2 18s. 10d. if 7 yards cost 14s. $8\frac{1}{2}$ d. ?
39. Multiply £3 18s. 9d. by $18\frac{1}{2}$.

SET 9.

1. In 7,496,385 feet how many miles, furlongs, &c.?
2. Reduce 7 lbs. 11 ozs. 4 dwts. 19 grains to grains.
3. If 31 lbs. of pepper cost £3 0s. 0½d. what will be the cost of 19 lbs.?
4. Find (by Practice) the value of 7,031 articles at £1 17s. 5½d. each.
5. In 50,739,678 seconds how many weeks, days, &c.?
6. If a man lose 1s. 3d. on an article which cost him 7s. 6d. what would he lose at the same rate if the article cost him £100?

7. Find (by Practice) the price of 8 waggon of sheep, each waggon containing 34 sheep, at £1 17s. 6d. per sheep.
8. How many acres, &c., are there in 1,704,056 square feet?
9. If 120 men can build a wall 18 feet high in 6 days how many will it take to build a wall 12 feet high in 15 days?
10. Find (by Practice) the price of 13 cwt. 2 qrs. 10 lbs. at £9 18s. 10d. per cwt.
11. If £120 gain £6 in 3 months what principal will gain £272 in 7½ months?
12. Find (by Practice) the dividend on £5,896 15s. at 17s. and 7d. in the pound.

13. Add together $\frac{3}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{15}$, $\frac{1}{20}$, $\frac{1}{24}$.
14. From $12\frac{3}{4}$ take $8\frac{1}{4}$.
15. Multiply $14\frac{1}{2}$ by $8\frac{1}{3}$.
16. Divide $7\frac{1}{2}$ by $\frac{1}{3}$.
17. Express 7 lbs. 11 ozs. as the fraction of 1 cwt. 2 lbs.
18. Find the value of $3\frac{1}{2}$ acres + $5\frac{1}{2}$ roods + $16\frac{1}{2}$ perches. Express the Answer in acres, roods, and perches.
19. How many horses in 10 days will plough a field which 16 horses will do in 15 days?
20. Find (by Practice) the loss on a debt of £478 10s. 0d. on which is paid 13s. 4d. in the £.

SET 9.

21. Add together 74·86095, 1·73, 10, 476·94, and ·800006.
 22. Subtract 17·0066 from 20·003.
 23. Multiply 17·406 by 3·7 and the product by ·01.
 24. Express 17 dwts. 12 grains as the decimal of 1 lb. 10 dwts.
 25. If 3 stones 10 lbs. of butter cost £2 8s. 9d. what will 13 lbs. cost?
 26. Find the price of 780 pairs of boots at 7s. 10½d. per pair
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27. Multiply 17 acres 3 roods 11 perches by 72.
 28. Divide 47 lbs. 6 ozs. 13 dwts. 22 grains by 29.
 29. Subtract 108 years 50 weeks 3 days from 120 years 15 weeks 2 days.
 30. From 9 tons 3 cwt. 2 qrs. take 7 tons 3 qrs. 14 lbs.
 31. Find the amount of £756 10s. 6d. for 8 years at 5 per cent. per annum, Simple Interest.
 32. Neglecting fractions of a penny what is the compound interest of £3,964 12s. 6d. for 3 years at 4½ per cent. per annum?
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33. What sum lent for 3 years at 4½ per cent. per annum, Simple Interest, will amount to £507 7s. 6d.
34. In what time will £657 12s. 6d. become £815 9s. 1½d. at 4 per cent. per annum, Simple Interest?
35. Find the simple interest of £758 12s. 7d. for 6 years at 3½ per cent. per annum.
36. Add together 7½, 8¼, ½, and 1½.
37. Subtract 7⅞ from 10⅞.
38. Multiply ·23 by ·36, and express the answer as a decimal.
39. Divide ·08886 by ·358, and express the answer as a decimal.

SET 10.

1. In 985,496 ozs. how many tons, cwts., &c.?
 2. If 15 yards of cloth cost £5 18s. 5½d. what will 319 yards cost?
 3. Find (by Practice) the dividend on £9,710 15s. 0d. at 9s. 2d. in the £
 4. How much copper can be bought for £3,076 1s. 3d. if 15 cwt. cost £2 12s. 6d.?
 5. In 999,685 pints how many loads, qrs., bushels, &c.?
-

6. Find (by Practice) the cost of 588 articles at 17s. 10d. per dozen.
 7. Reduce 5 acres 3 roods 10 yards to square inches.
 8. Add together $\frac{1}{17}$, $1\frac{1}{2}$, $2\frac{1}{17}$, and $4\frac{1}{3}$.
 9. Subtract $12\frac{2}{3}$ from $14\frac{1}{17}$.
 10. Multiply $14\frac{1}{17}$ by $6\frac{1}{17}$.
 11. Divide $\frac{1}{2}$ by $2\frac{1}{2}$.
 12. Add together 4209·34672, ·009, 74·93, and 614·523467.
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13. Subtract 1·00016 from 10·0001.
 14. Multiply 147·6984 by ·00697.
 15. Divide 18·607 by 187·9 to 5 places.
 16. Express $\frac{1}{7}$ of 13s. 4d. as the fraction of a guinea.
 17. How many half guineas in 78,964 half crowns?
 18. In what time will £785 amount to £949 17s. 0d. at 6 per cent. per annum, Simple Interest?
 19. Find (by Practice) the cost of flagging a court-yard 78 feet long, 60 feet wide, at 1s. 7½d. per square yard.
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20. What length of paper $\frac{3}{4}$ yards wide will paper the walls of a room 49 feet long, 24 feet wide, and 17 feet high.

SET 10.

21. Reduce $\frac{3}{4}$ of 20 perches to the decimal of an acre.
22. Add together $14\frac{1}{2}$, $\frac{1}{16}$, $4\frac{1}{16}$, $8\frac{1}{2}$, and $\frac{1}{8}$.
23. Subtract $7\frac{1}{2}$ from $9\frac{1}{4}$.
24. Multiply $16\frac{1}{2}$ by $5\frac{1}{16}$.
25. Divide $\frac{4}{3}$ by $4\frac{1}{2}$.
26. Express $\frac{1}{12}$ of a guinea as the fraction of a pound.

27. Add together 57·600704, ·47, ·00768, 6·4098, and 93·704.
28. Subtract 43·07649 from 243·0043.
29. Reduce $\frac{3}{4}$ of 6s. 3d. to the decimal of a crown.
30. Multiply £17 10s. 7d. by 18 $\frac{1}{2}$.
31. Divide a farm of 100 acres 8 perches into 29 equal parts.
32. Find (by Practice) the dividend on £7,846 10s. 6d. at 17s. 9d. in the £.
33. If 17 lbs. of cinnamon cost £2 18s. 9 $\frac{1}{2}$ d. what will 3 stones 2 lbs. cost?

34. Find the earnings of 18 men in 10 days when 20 women earn £30 10s. 6d. in 15 days, the work of 2 men being equal to that of 5 women.

35. In how many days will 17 men make 160 hats if 25 men can make 200 hats in 34 days?

36. Find the Simple Interest on £7,894 12s. 6d. for 3 years at $4\frac{1}{2}$ per cent. per annum.

37. Find the amount of £3,650 10s. 0d. for 2 years at 3 per cent. per annum, Compound Interest, neglecting fractions of a penny.

38. What will £757 10s. amount to in 4 years at $3\frac{1}{2}$ per cent. per annum, Simple Interest?

39. What sum will amount to £766 1s. 8d. in $3\frac{1}{2}$ years at $2\frac{1}{2}$ per cent. per annum, Simple Interest?

SET 11.

1. Multiply $\cdot 689$ by $\cdot 259$, and express the answer as a decimal
 2. Divide $3\cdot 72$ by $4\cdot 09$, and express the answer as a decimal.
 3. Multiply $5\cdot 008735$ by $\cdot 76007$.
 4. Subtract $0\cdot 72$ of an hour from $2\cdot 44$ of 6 hours 8 minutes.
Express the Answer in hours and minutes.
 5. Add together $1\cdot 625$ of a yard and $4\cdot 74$ of a furlong.
Express the Answer in yards, feet, and inches.
 6. Divide $14\frac{1}{2}$ by $5\frac{1}{3}$.
 7. Multiply together $5\frac{1}{2}$, $4\frac{1}{2}$, $\frac{2}{3}$, $\frac{1}{2}$, and $1\frac{1}{2}$.
 8. In what time will $\pounds 4,100$ amount to $\pounds 4,996$ 17s. 6d. at $3\frac{1}{2}$ per cent. per annum, Simple Interest.
 9. Find (by Practice) the cost of 2 tons 3 cwt. 2 qrs. 16 lbs. at $\pounds 2$ 12s. 0d. per cwt.
 10. If $\pounds 80$ gain $\pounds 4$ in 3 months what principal will gain $\pounds 60$ in 16 months.
 11. Reduce 6 acres 2 roods 10 yards to square inches.
 12. Reduce 540 inches to the decimal of a cubic foot.
-
13. Divide $154475\cdot 16$ by $18\cdot 6025$.
 14. Multiply $1\cdot 153825$ by $\cdot 401426$.
 15. Subtract $47\cdot 06963$ from $683\cdot 3276$.
 16. Add together $74\cdot 601698$, $\cdot 74$, $\cdot 00976$, $5\cdot 4076$, and $93\cdot 709$.
 17. Divide $3\frac{1}{2}$ by $3\frac{1}{3}$.
 18. Multiply $15\frac{1}{2}$ by $7\frac{1}{3}$.
 19. Subtract $5\frac{1}{2}$ from $7\frac{1}{3}$.
 20. Add together $9\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{3}$, $2\frac{1}{2}$, and $5\frac{1}{2}$.
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21. Find the amount of $\pounds 4,270$ 10s. 0d. in 3 years at 4 per cent. per annum, Compound Interest, neglecting fractions of a penny.

SET 11.

22. Find (by Practice) the cost of 7,840 sheep at £27 12s. 6d. per score.

23. What weight of copper can be bought for £29 13s. 2½d. if 7 cwt. can be bought for £9 9s. 10d.?

24. In 864,275 pints how many qrs. bushels, pecks, gallons, and pints?

25. Express 4 dwts. 19 grains as the decimal of a pound troy.

26. In 967,487 ozs. how many tons, cwts., qrs., &c.?

27. If 17 yards of silk cost £15 14s. 6d. how much may be bought for £104 10s. 6d.?

28. Find (by Practice) the income arising from a commission on £7,896 10s. at 7½d per pound.

29. Find the amount of £790 for 6 months at 3½ per cent. per annum, Simple Interest.

30. Find the simple interest on £365 12s. 6d. lent for 4 years at 2½ per cent.

31. What sum will an amount of £360 10s. arise from in 1½ years at 2½ per cent. per annum, Simple Interest?

32. Multiply 3 ozs. 6 dwts. 4 grains by 72. Express the result in ozs. and dwts.

33. Divide 100 acres 5 perches into 97 equal parts.

34. From 100 tons 3 qrs. 14 ozs. take 19 tons 2 cwt. 3 qrs. 24 lbs. 15 ozs.

35. If 18 men build a house in 10 days how many will build it in 16 days, eight of the latter being equivalent to nine of the former days.

36. Add $\frac{1}{2}$, $3\frac{1}{2}$, $8\frac{2}{3}$, $\frac{5}{8}$, and $7\frac{1}{3}$.

37. Subtract $18\frac{2}{3}$ from $20\frac{1}{3}$.

38. Multiply $6\frac{1}{2}$ by $\frac{3}{4}$.

39. Divide $3\frac{3}{4}$ by $\frac{1}{2}$.

SET 12.

1. Find the amount of £7,896 10s. 0d. for 3 years at 4 per cent. per annum, Simple Interest.
 2. Find the simple interest of £6,980 10s. 0d. for 4 years at $3\frac{1}{2}$ per cent. per annum.
 3. If 160 soldiers subsist for 10 weeks on 4,000 lbs. of bread how long will 15,000 lbs. support 1,000 soldiers?
 4. What will be the cost of 3 cwt. 2 stones of butter at 10s. $1\frac{1}{2}$ d. for 9 lbs.?
 5. Find (by Practice) the cost of 78 yards 3 quarters of silk at 15s. 9d. per yard.
 6. Find (also by Practice) the dividend on £4,593 12s. 6d. at 2s. 10d. in the pound.
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7. Reduce 674,968 gills to loads, qrs., bushels, &c.
 8. In 47 acres, 3 roods, 10 perches how many perches?
 9. Neglecting fractions of a penny find the compound interest of £376 12s. 10d. for 3 years at 4 per cent. per annum.
 10. If 17 men build a house in 10 days in what number of days and hours will 14 men do the same work, the working day to consist of 7 hours?
 11. In 4,890 French ells how many English ells?
 12. At what rate per cent. per annum will £767 10s. 0d. become £1,105 4s. 0d. in 8 years, Simple Interest?
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13. Add together $3\frac{7}{20}$, $4\frac{11}{15}$, $1\frac{2}{5}$, $8\frac{4}{15}$, and $7\frac{1}{4}$.
14. Subtract $11\frac{1}{12}$ from $20\frac{1}{12}$.
15. Multiply $1\frac{1}{10}$ by $\frac{1}{4}$.
16. Divide $10\frac{1}{2}$ by $\frac{1}{4}$.
17. Express $\frac{1}{2}$ of half a crown as the fraction of a guinea.

SET 12.

18. Add together 7·43698, 14·7, 698·006, ·74006, ·0000947.
19. Subtract 17·300016 from 19·200013.
20. Multiply 311·73 by 18·697.
21. Divide 186·73 by 1·456 to 3 decimal places.
22. Divide 17 acres 3 roods 10 perches by 19. Exhibit the Answer in roods and perches.
23. Reduce $\frac{1}{4}$ of a half sovereign to the decimal of a pound.

24. Find (by Practice) the price of 17 lbs. 10 oz. 10 dwts. 16 grains at £2 13s. 10d. per oz.
25. How much cloth at 14s. 9d. per yard will be the equivalent of 354 yards of silk at 11s. 6d. per yard?
26. What decimal of a half guinea is $\frac{1}{4}$ of 11s. 9½d.
27. Find (by Practice) the price of 14 cwt. 2 qrs. 14 lbs. at £1 12s. 6d. per cwt.
28. What will be the cost of 4½ acres of land at £2 15s. 7½d. for 1½ acres?
29. Multiply 14 lbs. 10 ozs. 11 dwts. 10 grains by 27.
30. Divide 10 tons 17 cwt. 2 qrs. equally between 29 persons.

31. Add together $7\frac{1}{11}$, $9\frac{5}{11}$, $\frac{1}{2}$, $7\frac{1}{11}$, and $4\frac{1}{11}$.
32. Subtract $9\frac{5}{11}$ from $16\frac{7}{10}$.
33. Multiply together $\frac{1}{12}$, $5\frac{1}{2}$, and $1\frac{1}{2}$.
34. Divide $11\frac{1}{12}$ by $6\frac{1}{2}$.
35. Express 1 qr. 7 lbs. as the fraction of 2 qrs. and 24 lbs.

36. Add together 17·30006, ·0009, 143, ·7, and 14·73641.
37. Subtract 10·30607 from 106·800013.
38. Multiply together 9·3, ·001, and 13·7.
39. Divide 175·427 by ·0019

SET 13.

1. Find the difference between the simple and compound interest of £7,840 10s. 6d. for 2 years at $4\frac{1}{2}$ per cent. per annum, neglecting fractions of a penny.

2. Find the amount of £380 10s. 0d. for 4 years at 6 per cent. per annum, Simple Interest.

3. Find (by Practice) the yearly rent of 78 acres 2 roods 24 perches at £2 9s. 10d. per acre.

4. In 78 loads 3 qrs. 4 bushels how many pints?

5. If 3 stones 4 ozs. of spice cost £9 3s. 1d. what will 2 qrs. 10 lbs. of same spice cost?

6. Find the time in which £362 10s. 0d. will amount to £435 at 5 per cent. per annum, Simple Interest.

7. How long will 700,000 lbs. of beef last 1,400 sailors if 10,000 lbs. last 40 sailors 100 days.

8. Find (by Practice) the net income from a property worth £78,647 12s. 6d a year on which a person has a claim of 3s. 11½d. in the £.

9. In 47,698,469 square inches how many acres, roods, &c.?

10. Add together $7\frac{4}{11}$, $3\frac{2}{11}$, $\frac{1}{11}$, $10\frac{2}{11}$, and $4\frac{2}{11}$.

11. Subtract $7\frac{2}{10}$ from $10\frac{2}{10}$.

12. Multiply together $3\frac{2}{3}$, $1\frac{1}{3}$, and $\frac{1}{12}$.

13. Divide $14\frac{2}{3}$ by $3\frac{2}{3}$.

14. What fraction of 1 lb. 2 oz. is 1 oz. 14 dwts. 16 grains?

15. Find the value of $3\frac{1}{2}$ acres + $5\frac{1}{2}$ roods + $3\frac{1}{4}$ perches.
Express the Answer in acres, roods, and perches.

16. Add together 743·00094, 16·73, 4·896, 1·0004, and 986.

17. Subtract 18·03749 from 24·0016.

18. Multiply 18·73 by 1·976.

19. Divide 18·796 by 1847·63 to 7 places.

SET 13.

20. Express $\frac{1}{4}$ of a guinea as the decimal of £1 6s. 8d.
 21. In 78,946 inches how many fathoms?
 22. Find the simple interest on £977 3s. 4d. for $3\frac{1}{2}$ years at 5 per cent per annum.
 23. What is the dividend £2,042 15s. at 13s. 7d. in the £?
 24. If for £13 17s. 4d. there can be bought 3 cwt. how much may be bought for £748 16s. 0d.?
 25. In 765,343 ozs. how many tons, cwts., &c.?
 26. Express 78 loads 3 bushels 3 pints in pints.
 27. Multiply 5 weeks 4 days 18 hours by $14\frac{1}{2}$.
 28. Find (by Practice) the cost of 52 cwt. of sugar at £4 16s. 10d. per cwt.
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29. If 40 Irish miles of railway cost £420,000 what ought 70 English miles of same line be worth?
 30. Add together $17\frac{1}{2}$, $3\frac{1}{2}$, $4\frac{1}{2}$, $5\frac{1}{2}$, and $\frac{1}{2}$.
 31. Subtract $17\frac{2}{5}$ from $100\frac{3}{5}$.
 32. Multiply together $3\frac{1}{2}$, $1\frac{2}{3}$, $1\frac{1}{4}$.
 33. Reduce 19s. 7 $\frac{1}{2}$ d. to the fraction of 5 $\frac{1}{2}$ d.
 34. Divide $19\frac{1}{2}$ by $\frac{1}{2}$.
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35. Add together 137·946, 3·7, 14·000697, 479, and 5678·14.
36. Subtract 13·730609 from 201·3204.
37. Multiply together 37·4673, and ·0069, and 7·3.
38. Multiply 1·27702 by 4·07, and express the answer as a decimal.
39. Divide 6·30 by 14·18, and express the answer as a decimal.

SET 14.

1. In 943,694 ozs. how many tons, cwt., qrs., &c.?
2. How much sugar may be bought for £748 16s. when the cost of 6 cwt. is £27 14s. 8d.?
3. Find (by Practice) the dividend on £5,826 15s. at 13s. 6d. in the £.
4. Find the simple interest on £954 6s. 8d. for $4\frac{1}{2}$ years at 5 per cent. per annum.
5. Add together $6\frac{1}{2}$, $2\frac{3}{8}$, $9\frac{5}{8}$, and $\frac{4}{8}$.
6. Subtract $6\frac{1}{2}$ from $11\frac{5}{8}$.

7. Multiply $9\frac{3}{8}$ by $12\frac{1}{2}$.
8. Divide $1\frac{7}{8}$ by $2\frac{3}{8}$.
9. Add together 101, 005, 0017, and 625.
10. Subtract 76.0037 from 1003.
11. Multiply 73.006 by 9.17.
12. Divide 91.606 by 612.13 to 5 places.
13. Reduce 12.025 miles to yards.

14. In 19524711 seconds how many weeks, days, &c.
15. If the 1s. loaf weigh 6 lbs. when wheat is 6s. the bushel what ought it to weigh when wheat is 6s. 9d. per bushel.
16. Find (by Practice) the duty on 14 tons 2 cwt. 18 lbs. of sugar, at 8s. 8d. per cwt.
17. Find the amount of £720 for 5 years at 3 per cent. per annum, Simple Interest.
18. Find the difference between the simple and compound interest of £360 17s. 10d. for 3 years at 4 per cent. per annum, neglecting fractions of a penny.
19. What is the present worth of a bill of £380 due in 15 months at 6 per cent. per annum?
20. In what time will £250 double itself at 6 per cent. per annum, Simple Interest?

SET 14.

21. At what rate will £600 become £744 in 4 years, Simple Interest?

22. In how many years would £900 become £1,116 at 3 per cent., Simple Interest?

23. Reduce 42,000 ozs. to the decimal of a ton, to 5 places of decimals.

24. Add together 1·02 of 12s. 6d. and ·004 of 15s.

25. Subtract ·125 of 8 days from ·45 of a week.

26. Multiply 3·076 by ·000074.

27. Divide 16·073 into 3·7 to 5 places of decimals.

28. Reduce 2 roods 17 perches to the decimal of an acre.

29. In 703,468 cubic inches how many cubic yards, feet, &c.?

30. Find the price of 3 cwt. 2 qrs. 10 lbs. of barley at 14s. per barrel of 16 stones.

31. If 42 men cut down 144 acres in 5 days how many men must be employed to cut down 230 acres 1 rood 24 perches in 3 days?

32. If 24 men earn £54 in 18 days how much will 18 women earn in 40 days, the work of 4 men being considered equal to that of 9 women?

33. Add $4\frac{1}{2}$, $2\frac{1}{3} + 4\frac{1}{4}$, and $\frac{1}{5}$.

34. Subtract $7\frac{1}{2}$ from $12\frac{1}{5}$.

35. Multiply $16\frac{1}{2}$ by $7\frac{1}{2}$.

36. Divide $17\frac{1}{2}$ by $2\frac{1}{2}$.

37. Reduce 3 stone 10 lbs. to the fraction of a cwt.

38. Which is greatest and which least of $\frac{1}{15}$, $\frac{1}{16}$, and $\frac{1}{17}$.

39. What do you add to $1\frac{1}{2}$ to make 2.

SET 15.

1. Find the amount of £847 12s. 10d. for 3 years at $4\frac{1}{2}$ per cent per annum, Compound Interest, neglecting fractions of a penny.

2. Find (by Practice) what is the value of 476 gallons 3 pints of spirits at 18s. $10\frac{1}{2}$ d. per gallon.

3. If 13 yards 2 qrs. of cloth cost £9 4s. 6d. what will be the price of 17 yards 2 nails?

4. Reduce 785,496 grains to lbs., ozs., dwts.

5. In 78 yards 3 quarters 2 nails how many inches?

6. If, when flour sells at 3 guineas per 20 stone, the 4 lb. loaf costs 7d. what ought to be the price of the 5 lb. loaf when flour sells at 54s. per 20 stone?

7. Multiply 78 cwt. 8 qrs. 10 lbs. by 78. Express the answer in tons, cwts., qrs., and lbs.

8. Divide 100 bushels 1 gallon 1 pint into 29 equal parts.

9. If 18 men do a piece of work in 9 days how long will 27 men take to do it?

10. In what time will £472 10s. amount to £600 1s. 6d. at 6 per cent. per annum, Simple Interest?

11. If $3\frac{3}{4}$ stones of butter cost £3 0s. 10d. what will be the cost of $7\frac{1}{2}$ cwt.?

12. Find (by Practice) the cost of paving a footpath 162 yards long and 7 feet wide at 1s. $0\frac{1}{2}$ d. per square yard.

13. Add together $14\frac{2}{3}$, $5\frac{2}{3}$, $3\frac{2}{3}$, $\frac{1}{3}$, and $3\frac{1}{2}$

14. From $90\frac{1}{2}$ take $80\frac{1}{2}$.

15. Multiply together $\frac{1}{2}$, $1\frac{1}{2}$, and $8\frac{1}{2}$.

16. Divide $10\frac{1}{2}$ by $\frac{1}{2}$

17. Express 3 furlongs 80 perches as the fraction of 2 miles 10 perches.

18. Find the simple interest on £783 15s. 1d. for $3\frac{1}{2}$ years at $4\frac{1}{2}$ per cent. per annum.

SET 15.

19. Add together 17'35694, '00016, 784, 8'06, and '0009.
20. Subtract 1'4706 from 15'01.
21. Multiply 17'306 by 9'003.
22. Divide 7'006 by 894'08.
23. Express $\frac{1}{16}$ of a rood as the decimal of $\frac{1}{4}$ of an acre.
24. Find (by Practice) the value of an estate of 786 acres 3 roods 12 perches at £2 14s. 10d. per acre.

25. Find (also by Practice) the assets of a bankrupt who can pay 7s. 9½d. in the pound on a debt of \$186 10s. 10d.
26. How much corn can be purchased for 50 gold coins when 70 bushels can be had for 80 gold coins, if 5 of the former coins are worth 7 of the latter.
27. How many flags, each a square whose side is 3 feet, will be required to cover a rectangle 360 feet long by 20 feet broad.
28. Multiply 7 bushels 3 pecks 1 gallon 2 pints by 19.
29. In 743,649 oza. how many cwt., qra., &c.

30. Add $7\frac{1}{2}$, $8\frac{1}{2}$, $1\frac{1}{2}$, $11\frac{1}{2}$, and $\frac{1}{2}$.
31. From $20\frac{1}{2}$ take $7\frac{1}{2}$.
32. Multiply together $\frac{1}{2}$, $1\frac{1}{2}$, and $1\frac{1}{2}$.
33. Divide $2\frac{1}{2}$ by $3\frac{1}{2}$.
34. Find the value of $\frac{1}{4}$ of 3 tons + $1\frac{1}{2}$ of 2 cwt. The Answer is to be given in tons, cwt., &c.
35. Reduce $\frac{1}{4}$ of 3 qra. 14 lbs. to the fraction of 1 cwt. 2 qrs.

36. Add together 3'70009, 13'4, 700'63, 498'7649, and 1'101.
37. Multiply 18'786 by '0063.
38. Multiply 8'118 by 27'5, and express the answer as a decimal.
39. Divide 5'418 by '4172, and express the answer as a decimal.

SET 16.

1. In 7,964,387 ozs. how many tons, cwt., qrs., &c.?
2. Reduce 17 loads 3 qrs. 1 gallon to pints.
3. Find the cost of 3 stone 12 lbs. of butter, if £28 3s. 6d. buys 3 cwt. 2 qrs.
4. If 18 men build a bridge in 10 days in how many days and hours will 14 men do it, reckoning 7 working hours to each day?
5. Find (by Practice) the cost of 3 lbs. 2 ozs. 10 dwts. 12 grains of gold at £2 18s. 10½d. per oz.
6. Find (also by Practice) the loss on a debt of £3,769 12s. 6d., upon which there is received 18s. 10½d. in the £.

7. If 12 men earn £28 in 14 days, in how many days will 15 men earn £40?
8. How much money will 20 boys earn in a certain time if 13 women earn in the same time £9 2s. 0d., the work of 3 women being considered equal to that of 5 boys.
9. In what time will £377 10s. 0d. amount to £441 13s. 6d. at 4 per cent. per annum Simple Interest?
10. What sum lent at simple interest for 3½ years at 2½ per cent. per annum will amount to £1,000 3s. 1½d.?
11. Find the simple interest on £786 12s. 6d. for 8 years at 3½ per cent. per annum.
12. How much money will 10 persons earn, while 18 persons are earning £34 19s. 4½d.?

13. Add together $7\frac{2}{3}$, $8\frac{7}{8}$, $5\frac{1}{2}$, $\frac{7}{8}$, and $10\frac{1}{4}$.
14. Subtract $11\frac{2}{3}$ from $18\frac{3}{5}$.
15. Multiply $11\frac{1}{3}$ by $3\frac{2}{5}$.
16. Divide $\frac{1}{3}$ by $10\frac{1}{4}$.
17. What fraction of 1 acre 10 perches is 3 roods 20 perches?
18. Add together 3.74, 14.70406, .00091, 47.6, and 479.8364.

SET 16.

19. Subtract 17·00179 from 20·3042.
 20. Multiply together 13·73, ·00067, and ·9.
 21. Divide ·01655838 by ·00603.
 22. Express $\frac{1}{2}$ of 2 stones as a decimal of 1 cwt. 1 qr. 20 lbs.
 23. In 17,846,793 square inches, how many acres, roods, &c.?
 24. Divide 84 acres 2 roods $17\frac{1}{2}$ perches by $4\frac{1}{2}$.
 25. Multiply 9 cwt. 3 qrs. 16 lbs. 10 ozs. by 34.
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26. Find the difference between the simple and compound interest of £376 10s. 6d. for 3 years at 4 per cent. per annum, neglecting fractions of a penny in both cases.

27. Find (by Practice) the cost of painting a room 34 feet long 27 feet wide and 18 feet high, at 1s. $7\frac{1}{2}$ d. per square yard.

28. Find the debts of a bankrupt who can pay 12s. 6d. in the £, and whose total payment is £786 12s. 6d.

29. Find (by Practice) the cost of a marble slab 6 feet long 3 feet broad and $1\frac{1}{2}$ feet thick, at 2s. $10\frac{1}{2}$ d. per solid foot.

30. If 18 carpenters earn £18 19s. $10\frac{1}{2}$ d. in 3 weeks, what ought 12 carpenters earn in 5 weeks?

31. Add together $3\frac{1}{2}$, $14\frac{2}{3}$, $7\frac{4}{5}$, $\frac{1}{11}$, and $9\frac{7}{8}$.

32. Subtract $7\frac{1}{3}$ from $9\frac{1}{3}$.

33. Multiply together $3\frac{1}{2}$, $\frac{1}{2}$, and $1\frac{1}{2}$.

34. Divide $7\frac{1}{2}$ by $1\frac{1}{2}$.

35. Express 3 bushels 2 pecks as the fraction of a load.

36. Add together 17·0009, 3·06, 14·7003056, 47, and 609·4.

37. Subtract 17·40609 from 20·0101.

38. Multiply 7·009 by 13·06.

39. Divide, to 5 decimal places, 7·469 by 13·7.

SET 17.

1. Find the simple interest of £395 8s. 10d. for 4 years at $5\frac{1}{2}$ per cent. per annum.

2. What is the compound interest on £739 12s. 10d. for 3 years at 5 per cent., per annum neglecting fractions of a penny?

3. If 15 men earn £7 17s. 6d., what will be the earnings of 21 men?

4. Find (by Practice) the cost of a farm of 100 acres 3 roods 10 perches, at £29s. 6d. per acre.

5. What is the cost of surrounding a square with a paling at 1s. per lineal foot, supposing the square to contain 10,000 square yards?

6. At what rate per cent. per annum simple interest will £927 10s. 0d. amount to £1,048 1s. 6d. in $3\frac{1}{2}$ years?

7. Reduce 78 loads 3 qrs. 1 gallon to pints.

8. In 736,947 grains how many lbs., ozs., dwts., &c.?

9. Express 47,843 inches in fathoms, feet, &c.

10. In 1,046,934 seconds, how many days, &c.?

11. Add together $11\frac{1}{2}$, $8\frac{2}{3}$, $14\frac{3}{5}$, $7\frac{1}{2}$, and $\frac{1}{3}$.

12. Subtract $4\frac{1}{2}$ from $10\frac{1}{2}$.

13. Multiply together $1\frac{1}{2}$, $\frac{1}{2}$, and $3\frac{1}{2}$.

14. Divide $11\frac{1}{2}$ by $\frac{1}{2}$.

15. Express $\frac{1}{4}$ of 1 rood 10 perches as a fraction of 1 rood.

16. Find the value of $\frac{1}{4}$ of 3 acres + $\frac{1}{2}$ of 3 roods, + $\frac{1}{16}$ of 30 perches. Express the Answer in acres, roods, and perches.

17. What sum now lent will produce £3,144 4s. 6d. in 4 years at $3\frac{1}{2}$ per cent. per annum, Simple Interest.

18. If 13 horses plough 3 acres 27 perches, how much land ought 12 mules plough, the work of 3 horses being equal to that of 4 mules?

SET 17.

19. What is the rent of an acre of land, when a farm of 40 acres 3 roods 20 perches pays a rent of £71 10s. 7½d.?

20. Add together 143·96748, 476, 8·43, ·0000679, and 40·3.

21. Subtract 174·00673 from 200·001.

22. Multiply ·61749 by 3·007.

23. Divide 73·46 by 136·9, to 4 places of decimals.

24. Express 6 days 12 hours as the decimal of 2 weeks 2 days 16 hours.

25. Find the value of £6 + ·75 of a crown + ·125 of a shilling. Exhibit the Answer in shillings and pence.

26. Multiply 14 weeks 2 days 13 hours by 15.

27. Divide 9,786 acres 3 roods 13 perches equally between 49 tenants.

28. Add together $13\frac{7}{8}$, $4\frac{1}{2}$, $3\frac{1}{4}$, $4\frac{3}{8}$, and $1\frac{1}{2}$.

29. Subtract $11\frac{3}{8}$ from $19\frac{7}{8}$.

30. Multiply together $\frac{2}{3}$, $1\frac{1}{2}$, and $3\frac{1}{2}$.

31. Divide $11\frac{1}{2}$ by $9\frac{1}{4}$.

32. From ·166 of a cwt. take 1·11 of 8 lbs. 6 ozs. Express the Answer in lbs. and ozs. and the decimal of an oz.

33. Divide £44 5s. 0d. by 29·25. Give the result in £. s. d.

34. Reduce $5\frac{1}{2}$ of 4 minutes to the decimal of ·75 of an hour.

35. How many lbs., ozs., drams., and scruples in 1,749,634 scruples?

36. From 17 years 11 weeks 3 days, take 14 years 13 weeks 4 days.

37. Find (by Practice) the dividend on £5,096 at 17s. 9d. in the £.

38. When poor rates are 7d in the £, my income is £5 4s. 6d. less than when they were 5½d., what is the gross income?

39. Reduce 78 guineas 10s. and 6d. to farthings.

SET 18.

1. Find the compound interest of £6,984 12s. 10d. for 3 years at $4\frac{1}{2}$ per cent. per annum neglecting fractions of a penny.
 2. Find the amount of £496 10s. 0d. for $3\frac{1}{2}$ years at $5\frac{1}{2}$ per cent. per annum, Simple Interest.
 3. How much land can 24 labourers dig, if 17 labourers dig 24 acres 1 rood 30 perches?
 4. Find the value of 13 gallons of wine, if 18 gallons of a different quality are worth £11 3s. 6d., and 6 gallons of the latter are only worth $3\frac{1}{2}$ of the former.
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5. Add together $9\frac{1}{2}$, $4\frac{7}{8}$, $6\frac{2}{5}$, and $11\frac{7}{8}$.
 6. Subtract $11\frac{1}{4}$ from $17\frac{3}{4}$.
 7. Multiply $9\frac{1}{2}$ by $3\frac{1}{2}$.
 8. Divide $16\frac{2}{3}$ by $7\frac{1}{2}$.
 9. Simplify the expression: $\frac{3\frac{1}{2} + 4\frac{1}{2}}{3\frac{1}{2} - 1\frac{1}{2}} \times 1\frac{1}{2}$.
 10. At what rate per cent. per annum, will £755 14s. 3½d. amount to £1,046 13s. 3½d. in 7 years, Simple Interest.
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11. Add together 176·00016, 13·7, ·000943, and 47, and ·7.
 12. Subtract 14·009 from 17·0034.
 13. Multiply 18·0096 by 7·904.
 14. Divide ·069046 by ·0023
 15. Find the value of 7 tons + 1·25 cwt. + 3·125 qrs. giving the answer in cwt.s., qrs., lbs., and ozs.
 16. Express $\frac{1}{8}$ of 1 hour 20 minutes, as the decimal of 3 hours 20 minutes.
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17. In 476,947 ozs., how many tons, cwt.s., &c.?
18. Reduce 5 loads 3 quarters 2 gallons to pints.

SET 18.

19. How many suits of clothes each containing $3\frac{1}{2}$ yards can be made from a piece of 136 yards 2 qrs.?

20. Multiply £7 10s. $6\frac{1}{2}$ d. by 476.

21. Divide £17 12s. 6d. between 11 men giving to one £1 2s. 6d. more than to each of the others.

22. How long will 8 men take to do a piece of work which 12 men can do in 6 hours?

23. Find (by Practice) the net income on a property of £7,848 12s. 6d. upon which a tax of 2s. 10d. in the £. is paid.

24. Add together $7\frac{1}{10}$, $19\frac{1}{11}$, $4\frac{7}{12}$, and $5\frac{2}{15}$.

25. Subtract $11\frac{1}{12}$ from $20\frac{1}{4}$.

26. Multiply $17\frac{1}{12}$ by $3\frac{2}{3}$.

27. Divide $16\frac{2}{3}$ by $4\frac{1}{2}$.

28. Add together $\frac{1}{2}$ tons, $\frac{1}{4}$ cwts., $\frac{1}{16}$ qrs., and $\frac{1}{8}$ lbs.

29. Express $\frac{2}{3}$ of 3 qrs. as the fraction of a ton.

30. What fraction of a guinea is 12s. 6d.?

31. Add together 19·307, 406·7, 188·732496, 4·89, and 1679.

32. From 100·7306 take 21·817359.

33. Multiply together ·11, ·7369, and 4·7.

34. Divide 284·6957568 by 18·0096.

35. Express $\frac{1}{4}$ acres as the decimal of 2 roods 20 perches.

36. Multiply £·45 by 9·125, expressing the result in pounds, shillings, and pence.

37. Express $\frac{1}{16}$ in the decimal form.

38. Multiply 5·81 by ·00260416, and express the answer as a decimal.

39. Divide 2·807692 by 2·142857, and express the answer as a decimal.

SET 19

1. If 3 cwt. 2 qrs. of sugar cost £6 18s. 10d., what is the price of $1\frac{1}{2}$ stones?
 2. In what time will 24 horses plough a field which 16 horses will plough in 12 days?
 3. In 786,493 square feet, how many acres, roods, perches, &c.?
 4. Express 17 tons 3 qrs. 7 lbs. in pounds.
 5. How many suits of clothes, each containing 3 yards 3 nails, can be cut from a piece containing 60 yards 2 quarters 1 nail?
-

6. In how many days of 10 hours each, will 20 men reap a field which 15 men can do in 5 days of 8 hours each?
 7. Subtract 13 years 10 weeks 4 days 16 hours from 20 years.
 8. Multiply 7 acres 3 roods 12 perches by $7\frac{1}{2}$.
 9. Divide 19 yards 2 qrs. 3 nails by $7\frac{1}{2}$.
 10. Find (by Practice) the cost of flooring a room 27 feet 9 inches long and 16 feet wide, at 2s. $7\frac{1}{2}$ d. per square yard.
-

11. Add together $11\frac{1}{2}$, $7\frac{2}{5}$, $8\frac{1}{2}$, and $16\frac{1}{10}$.
 12. Subtract $13\frac{2}{3}$ from $23\frac{1}{3}$.
 13. Multiply together $\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$.
 14. Divide $16\frac{1}{2}$ by $1\frac{1}{2}$.
 15. Multiply $\frac{1}{4}$ of 3 tons 2 cwt. by 14. Express the result in tons, &c.
 16. Divide $\frac{1}{4}$ of 8 guineas by $\frac{1}{2}$. Exhibit the Answer in £ s. d.
 17. Express $\frac{1}{2}$ of 3 stones as the fraction of 1 cwt.
-

18. Add together 7496, 14397, 64789864, and 000796.
19. Subtract 75436984 from 10032473.
20. Multiply 1767394 by 97406.
21. Divide 688619119856 by 3534788 to four decimal places.

SET 19.

22. What is the value (in acres, roods, perches, &c.) of 4.75 acres, + 3.125 roods, + 17.5 perches?
 23. Reduce 4.25 lbs. to the decimal of 1 cwt. 1 qr. 20 lbs.
 24. In 7,846,934 pints how many loads, qrs., &c.?
 25. In 78 acres 3 roods 15 perches how many square yards?
 26. Reduce 1,469,874 inches to miles, furlongs, &c.
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27. How much tea can be purchased for 20 guineas if 70 lbs. can be had for £8 15s. 0d.; 4 lbs. of the latter being worth 5 lbs. of the former?
 28. Find the amount of £496 5s. 0d. for $2\frac{1}{2}$ years at $3\frac{1}{2}$ per cent. per annum, Simple Interest.
 29. What is the compound interest of £785 10s. 6d. for 3 years at 4 per cent. per annum, neglecting fractions of one penny?
 30. In what time will £352 10s. 0d. become £447 13s. 6d. at 6 per cent. per annum, Simple Interest?
 31. What is the present worth of £1,343 0s. 6d. lent for 9 years at 3 per cent. per annum, Simple Interest?
-

32. Add together $75\frac{1}{2}$, $1\frac{1}{4}$, $13\frac{3}{4}$, $7\frac{1}{2}$, and $16\frac{1}{4}$.
 33. Subtract $9\frac{1}{2}$ from $13\frac{1}{2}$.
 34. Multiply together $4\frac{1}{2}$, $1\frac{1}{2}$, and $\frac{1}{2}$.
 35. Divide $14\frac{1}{2}$ by $8\frac{1}{2}$.
-

36. Add together 3.7, 14.76984, .000673, 1496.18, and .706.
37. Subtract 15.30067 from 19.300539.
38. Multiply $5.2\bar{3}$ by $13.3\bar{7}$.
39. Divide $.23\bar{7}2$ by $.177\bar{2}$, and express the answer as a decimal correct to six places.

SET 20.

1. Add together $13\frac{1}{2}$, $19\frac{3}{4}$, $8\frac{1}{12}$, $10\frac{1}{18}$, and $\frac{1}{12}$.
 2. Subtract $9\frac{3}{4}$ from $16\frac{1}{12}$.
 3. Multiply $17\frac{1}{2}$ by $2\frac{1}{12}$.
 4. Divide $\frac{2}{3}$ of $12\frac{3}{4}$ by $3\frac{1}{12}$.
 5. Express $\frac{2}{3}$ of $3\frac{1}{2}$ guineas as the fraction of £5.
 6. Find the sum of the following:— $2\frac{1}{2}$ miles, $6\frac{1}{2}$ furlongs, $107\frac{1}{2}$ perches, expressing the result in miles, furlongs, &c.
 7. Reduce 13 acres 2 roods 10 perches to square feet.
 8. In 4,769,947 inches, how many miles, furlongs, &c.?
-

9. Add together 17·40693, 873·3, 6497·7569, ·0000367, and 49.
 10. Subtract 194·736496 from 200·06724.
 11. Multiply together 14·93, ·067, and 1·001.
 12. Divide ·121031712 by 3·0672.
 13. Add together ·225 of 18s., ·375 of a crown, and 1·125 of a shilling. Express the Answer in £ s. d.
 14. What decimal of an acre is ·56 of 2 roods 20 perches?
-

15. Find (by Practice) the assets of a bankrupt who can pay 11s. $10\frac{1}{2}$ d. in the £, on a debt of £7,868 15s. 0d.
16. Find the cost of a mahogany slab 24 feet long, $3\frac{1}{2}$ feet broad, and $2\frac{1}{2}$ feet thick, at $7\frac{1}{2}$ d. per cubic foot.
17. If the rent of 13 acres 2 roods 10 perches be £15 16s. $5\frac{1}{2}$ d., how much ought a farm of 47 acres 3 roods 14 perches fetch?
18. In what time will 50 men do a work, which 20 men will do in 18 days?
19. How many mills must be set to grind 18,000 bushels of corn in 12 days, if 5,000 bushels can be ground by 25 mills in 6 days, 3 of the latter working as much as 5 of the former.

SET 20.

20. What is the compound interest of £389 10s. 6d. for three years at 5 per cent. per annum, neglecting fractions of a penny.

21. Find the amount of £967 10s. 0d. for $5\frac{1}{2}$ years at $4\frac{1}{2}$ per cent. per annum, Simple Interest?

22. Find the cost of the paper of a room 36 feet long, 18 feet broad, and 12 feet 9 inches high, the paper being 2 feet 9 inches broad, at 1s. $10\frac{1}{2}$ d. per dozen yards.

23. If the price of 3 bushels 1 gallon of corn is £1 0s. $3\frac{1}{2}$ d., find the cost of 2 qrs. 1 peck.

24. At what rate per cent. per annum will £697 12s. 6d. amount to £865 1s. $1\frac{1}{2}$ d. in 4 years, Simple Interest?

25. In 217,894,634 seconds, how many years, days, &c.?

26. Express 94 ells 3 qrs. 2 nails in inches.

27. If the cost of 3 lbs. Avoirdupois is £1 3s. 4d., what is the cost of 15 lbs. Troy?

28. Express 9,867 scruples, in lbs., ozs., drams, &c.

29. In what time will £700 lent at 6 per cent. per annum, Simple Interest, double itself.

30. Add together $9\frac{3}{4}$, $18\frac{2}{3}$, $7\frac{5}{10}$, $4\frac{7}{12}$, and $1\frac{1}{6}$.

31. Subtract $17\frac{3}{4}$ from $20\frac{3}{4}$.

32. Multiply together $1\frac{1}{2}$, $\frac{2}{3}$, and $\frac{1}{12}$.

33. Divide $19\frac{1}{2}$ by $7\frac{1}{2}$.

34. Simplify: $\frac{1\frac{1}{2} \times \frac{2}{3} \text{ of } 1\frac{1}{12}}{\frac{1}{2} + 1\frac{1}{3} + \frac{1}{4}}$

35. Add together .0000167, 365.09, 13.7493654, .0014, and 1.476.

36. Subtract 7.436094 from 20.01234.

37. Multiply .00679 by .0374.

38. Divide .000734 by .0095 to 4 decimal places.

39. Add together 1.125 guineas .375 crowns, and .9 of 6s. 8d. Give the result in £ s. d.

SET 21.

1. Reduce 13 years 6 days 7 hours to minutes.
2. In 47,964 grains how many lbs., ozs., drams, &c.?
3. Multiply 3 cwt. 3 qrs. 14 lbs. by 5 $\frac{1}{2}$.
4. Divide 14 stones 10 lbs. of sugar between 9 men, giving to one 1 stone 3 lbs. more than to each of the others.
5. Find (by Practice) the income tax on £7,509 13s. 4d. at 10 $\frac{1}{2}$ d. in the £.
6. Find (also by Practice) the cost of flooring a room 36 feet long, 25 feet 9 inches broad, at 2s. 8 $\frac{1}{2}$ d. per square yard.

7. Find the compound interest on £743 12s. 4d. for 3 years at 4 $\frac{1}{2}$ per cent. per annum, neglecting fractions of a penny.
8. In how many days ought 12 men do a piece of work which 18 men can do in 4 days?
9. Find the price of 3 cwt. 2 qrs. 10lbs. of sugar, when 4 stones are valued at 17s. 6d.
10. In 4,789,646 pints, how many loads, bushels, &c.?
11. Express in seconds:—15 years, 17 days, 14 minutes.
12. In what time will £372 10s. 0d. become £499 3s. 0d. at 4 per cent. per annum, Simple Interest.
13. What will be the weight of the 6d. loaf when flour is at 42s. per bushel, if the 4d. loaf weighs 2 lbs. when flour is at 56s. per bushel.

14. Add together $17\frac{2}{5}$, $1\frac{1}{2}$, $7\frac{1}{2}$, $8\frac{1}{5}$, and $\frac{1}{10}$.
15. Subtract $19\frac{3}{4}$ from $40\frac{1}{4}$.
16. Multiply $7\frac{1}{2}$ by $\frac{1}{2}$.
17. Divide $19\frac{1}{2}$ by $2\frac{1}{2}$.

$$18. \text{Simplify: } \frac{4\frac{1}{2} \div \frac{2}{14\frac{1}{2}}}{\frac{1}{2} \times 1\frac{1}{2}}$$

SET 21.

19. What fraction of 3 stones 8 lbs. is $\frac{2}{3}$ of $\frac{1}{2}$ tons?
 20. Find the value of $\frac{1}{2}$ miles + $17\frac{1}{2}$ furlongs + $1\frac{1}{4}$ perches,
 expressing the result in miles, furlongs, and perches.
-

21. Add together 479·63, ·073296, 14·39, ·69473.
 22. Subtract 836·73947326 from 1000·243206.
 23. Multiply together 17·39, ·00067, and 13·98.
 24. Divide to 4 places of decimals ·00369 by ·047.
 25. Find what decimal of 3 acres is 2 roods 10 perches?
 26. If 18 men earn £2 6s. 10½d., what will 29 men earn?
-

27. Find (by Practice) the income tax on £7,844 12s. 6d. at 10½d. in the £.

28. What sum of money will 14 boys earn if 18 women can in the same time earn £17 1s. 9d., the work of 7 boys being equal to that of 6 women.

29. Express 7,894,678 pints in loads, qrs. bushels, &c.

30. Add together $7\frac{1}{12}$, $14\frac{2}{15}$, $17\frac{3}{20}$, $\frac{1}{21}$, $9\frac{1}{12}$.

31. Subtract $13\frac{1}{2}$ from $17\frac{1}{12}$.

32. Multiply together $7\frac{1}{2}$, $8\frac{1}{2}$, and $\frac{1}{12}$.

33. Divide $7\frac{1}{12}$ by $\frac{1}{12}$.

34. Add together £7½, 3½ guineas, and 2½ crowns. Express the Answer in £ s. d.

35. Add together 17·9647, 204·13, ·003765, 365, 1·493.

36. Subtract 143·7369 from 150·01204.

37. Multiply 173·046 by ·0097.

38. Multiply 8·69 by $21\frac{1}{2}$, and express the answer as a decimal.

39. Divide ·25227 by ·9081, and express the answer as a decimal to seven places.

SET 22.

1. In 1,784,693 feet, how many miles, furlongs, perches, &c.?
2. Reduce 78 years 14 days to minutes.
3. Multiply 19 acres 3 roods 5 perches by $10\frac{1}{2}$.
4. Divide £967 0s. 7d. equally between 29 men.
5. How much bread can be bought for $4\frac{1}{2}$ d., if $7\frac{1}{2}$ d. buy 3 lbs. 12 oza.?
6. If 15 mills grind 600 barrels of flour in 6 days, how long ought 40 mills take to grind 8,000 barrels?

7. Add together $19\frac{1}{2}$, $13\frac{1}{2}$, $7\frac{1}{4}$, $3\frac{1}{8}$, and $\frac{1}{8}$.
8. Subtract $18\frac{1}{2}$ from $27\frac{1}{2}$.
9. Multiply together $13\frac{1}{2}$, $\frac{1}{4}$, and $1\frac{1}{2}$.
10. Divide $19\frac{1}{2}$ by $1\frac{1}{4}$.

11. In 17 tons 3 cwt. 2 qrs. 10 lbs. how many oza.?
12. In 5,496,784 square feet, how many acres, roods, &c.?
13. Find the compound interest on £785 16s. 10d. for 3 years at $4\frac{1}{2}$ per cent. per annum, neglecting fractions of a penny.
14. Find the amount of £367 10s. 0d. for $3\frac{1}{2}$ years at $4\frac{1}{2}$ per cent. per annum, Simple Interest.
15. In what time will £543 15s. 0d. become £657 18s. 9d. at $5\frac{1}{2}$ per cent. per annum, Simple Interest?

16. What is the simple interest of £372 12s. 6d. for 4 years at 5 per cent. per annum?
17. What sum in $3\frac{1}{2}$ years at 6 per cent. per annum, Simple Interest, will amount to £612 8s. 9d.?
18. Find the price of 13 stones $7\frac{1}{2}$ lbs. of butter at £7 9s. 4d. per cwt.
19. What is the value of 24 loads of barley, when 18 loads of oats cost £101 5s. 0d., three loads of barley being equal in value to four loads of oats?

SET 22.

20. Find (by Practice) the value of 784 sheep at £2 12s. 10d. each.

21. Find (also by Practice) the cost of 17 cwt. 2 qrs. 14 lbs. of sugar at £3 14s. 9d. per cwt.

22. In 3 miles 2 furlongs, how many fathoms?

23. What is the simple interest of £372 12s. 6d. for $3\frac{1}{2}$ years, at $4\frac{1}{2}$ per cent. per annum?

24. If in 6 days 12 men plough a field, in how many days will 18 men do it?

25. In 78,463,945 seconds, how many years, days, &c.?

26. How divide £15 19s. 6d. amongst 5 men, so as to give one of them £1 9s. 0d., and another £2 0s. 6d., more than to each of the remaining three?

27. What is the present worth of a bill of £395 5s. 0d., due four years hence, at 6 per cent. per annum?

28. Add together $19\frac{3}{4}$, $17\frac{5}{8}$, $14\frac{6}{7}$, $6\frac{7}{8}$, and $1\frac{1}{2}$.

29. Subtract $10\frac{6}{7}$ from $17\frac{5}{8}$.

30. Multiply together $3\frac{1}{2}$, $1\frac{1}{7}$, and $1\frac{2}{3}$.

31. Divide $17\frac{1}{2}$ by $\frac{3}{4}$.

32. What is the value of $17\frac{1}{2}$ acres + $14\frac{1}{2}$ roods + 12 perches?
Express the Answer in acres, roods, and perches.

33. Express $\frac{2}{3}$ of 2 roods 20 perches as the fraction of 3 acres.

34. Simplify the expression: — $\frac{(4\frac{1}{2} + 7\frac{1}{2}) \div 3\frac{1}{2}}{\frac{1}{2} \times 2\frac{1}{2} \times 5\frac{1}{2}}$.

35. Add together 134·73609, 4·89, 17·6493256, ·006079, and 400·6.

36. Subtract 18·732946 from 20·3241.

37. Multiply 3·46 by 7·0489.

38. Multiply ·196 by ·14784, and express the answer as a decimal.

39. Divide ·3839 by ·182, and express the answer as a decimal.

SET 23.

1. Multiply £4 17s. 10½d. by 29.
 2. Divide £186 14s. 3d. by 39.
 3. From 13 acres 3 roods 10 perches 20 yards take 9 acres 3 roods 20 perches 25½ yards.
 4. In 3 loads 2 qrs. 3 pecks how many gallons?
 5. Reduce 21,749,674 square inches to acres, roods, &c.?
 6. Express in English ells, qrs., and inches, 47,698 inches.
 7. Reduce 94,716,835 square inches to acres. &c.
-

8. Find (by Practice) the cost of 3 lbs. 9 ozs. 12 dwts. of gold at £3 17s. 6d. per oz.

9. What is the cost of 8½ tons if 4½ cwt. cost 8 shillings?

10. If a cask of wine containing 13 gallons be worth £7 16s. what is the value of 24 gallons, 6 gallons of the latter being worth 7 gallons of the former?

11. Find the simple interest on 21 guineas for 20 years at 5 per cent. per annum.

12. Find the rent of 34 acres 3 roods 14 perches at £1 2s. 9d. per acre.

13. Add $4\frac{1}{2}$, $\frac{3}{7}$, $\frac{2}{3}$, and $1\frac{3}{4}$.

14. From $3\frac{1}{2}$ take $2\frac{1}{4}$.

15. Find the continued product of $3\frac{1}{2}$, $2\frac{1}{2}$, $\frac{7}{6}$, and $\frac{1}{3}$.

16. Divide $7\frac{1}{2}$ by $16\frac{1}{2}$.

17. Add together 3475·00009, 84·76, ·023, 7·695, ·487639.

18. From 7·0936 take ·00874.

19. Multiply 375·42 by 1·0024.

20. Divide 207 by ·0828.

21. Find the amount of £2300 for 4 years at 4½ per cent. per annum, Compound Interest, neglecting fractions of a penny.

22. How many pints in 17 bushels 1 gallon?

23. How many square yards, feet, and inches on the surface of the walls of a room 24 feet 7 inches long, 23 feet 6 inches wide, and 15 feet high?

SET 23.

24. Find the price of 18 acres 3 roods of ground at £4 13s. 6d. for 4 acres 1 rood.

25. In 75,495 half sovereigns how many 7 shilling pieces?

26. If 16 men require 30 days to build a house, how many men will do it in 12 days?

27. What sum lent for 8 years at 3 per cent. per annum, Simple Interest, will amount to £871 17s. 6d.?

28. Find (by Practice) the cost of 18 yards 3 qrs. 2 nails of cloth, at 17s. 10½d. per yard.

29. What is the cost of 17 cwt. 2 qrs. 10 lbs., if 7 stones 1½ lbs. cost 16s. 7d.?

30. In how many years will £342 10s. 0d. amount to £390 9s. 0d., at 3½ per cent. per annum, Simple Interest?

31. In 4,789,643 ozs., how many tons, cwts., qrs., &c.?

32. If the rent of 3 acres 2 roods of land is £4 18s. 0d., what will be the rent of a farm containing 89 acres 3 roods 10 perches?

33. If 49 acres of statute measure are rented for £44, what will be the rent of 77 acres Irish measure?

34. Find (by Practice) the cost of 78 yards 3 qrs. 2 nails of cloth at 17s. 10½d. per yard?

35. What is the amount of £360 12s. 6d. for 8 years at 3½ per cent. per annum, Simple Interest.

36. Find the cost of papering a room 47 feet 6 inches long, 18 feet broad, and 12 feet high, the paper being 2 feet 3 inches broad, at 2s. 7d. per dozen yards.

37. Find also (by Practice) the assets of a bankrupt who can pay 16s. 9½d. in the £. on a debt of £7,846 10s.

38. What is the price of 78 barrels of brandy, if 16 barrels of rum cost £151 12s., 13 barrels of brandy being the equivalent of 24 barrels of rum?

39. Divide £2,686 15s. among 3 persons in the following proportions, .08, .3, and .3.

SET 24.

1. Add together $71\frac{1}{10}$, $3\frac{9}{10}$, $1\frac{1}{2}$, $17\frac{4}{5}$, and $\frac{1}{10}$.
2. Subtract $7\frac{1}{2}$ from $20\frac{1}{4}$.
3. Multiply together $3\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{4}$.
4. Divide $7\frac{1}{4}$ by $\frac{1}{4}$.
5. Simplify the expression:— $\frac{4\frac{3}{4} \div 1\frac{1}{4}}{2\frac{1}{2} \times 3\frac{1}{2}} \times \frac{1}{2}$.
6. Express $\frac{1}{4}$ of 1 stone 10 lbs. as the fraction of $\frac{3}{4}$ of 1 cwt. 12 lbs.

7. Add together 17·493647, ·00639, 4·006, 13·967; 431·2.
8. Subtract 39·0634789 from 83·0042.
9. Multiply 174·3394 by ·00793.
10. Divide 1·4739 by 136·489 to 5 decimal places.
11. Simplify:— $\frac{14·296 \times ·004}{7·432 \div 6·9}$.
12. Express 3·375 shillings as the fraction of £·125.

13. Reduce 78 tons 3 cwt. 2 lbs. to ozs.
 14. Express 47,896,473 square inches in acres, roods, &c.
 15. Reduce 17 qrs. 3 bushels to pints.
 16. Express 350 lbs. Troy in Avoirdupois lbs.
 17. Express 389 statute miles in Irish miles (Lineal).
 18. Express 350 English acres in acres, roods, perches (Irish.)
-
19. If 57 barrels 9 stones of barley cost £51 16s. 1½d., what is the price of 12 barrels (16 stones to the barrel) ?
 20. What will be the price of 7 lbs. (Troy) of silver when 10 Avoirdupois lbs. cost £26 ?
 21. Find the rent of 40 acres, when a farm of 13 acres 20 perches rents at £19 13s. 9d.

SET 24.

22. If 20 men can do a piece of work in $13\frac{1}{2}$ days, how many men will do it in $2\frac{1}{10}$ days?

23. What will be the rent of 48 acres of land when 25 acres cost £30, five acres of the latter being worth eight of the former?

24. Find the simple interest on £762 12s. 6d. for $2\frac{1}{2}$ years at 4 per cent. per annum.

25. Find by Practice the rent of 786 acres, at £2 15s. 10d. per acre.

26. Find the compound interest of £762 12s. 10d. for 3 years at 5 per cent. per annum, neglecting fractions of a penny.

27. In how many years will £362 10s. 0d. become £409 12s. 6d. at $3\frac{1}{2}$ per cent. per annum, Simple Interest?

28. What sum will amount to £1,228 17s. 6d., in 2 years at $6\frac{1}{2}$ per cent. per annum, Simple Interest?

29. Find (by Practice) the cost of painting the walls of a room 27 feet long, 18 feet wide, and 12 feet high, at 2s. $10\frac{1}{2}$ d. per square yard.

30. Add together $14\frac{7}{8}$, $50\frac{1}{2}$, $17\frac{9}{10}$, $\frac{4}{15}$, and $8\frac{7}{8}$.

31. Subtract $10\frac{3}{4}$ from $20\frac{1}{4}$.

32. Multiply $13\frac{1}{2}$ by $2\frac{2}{3}$.

33. Divide $16\frac{1}{2}$ by $2\frac{1}{2}$.

34. Find a fourth proportional to the sum, difference, and product of $\frac{1}{2}$ and $\frac{1}{3}$.

35. Add together 17.4963, 4.009, .0069074, 406.7, and .9.

36. From 170.4063 take 79.50786.

37. Multiply .0096749 by .000478.

38. Multiply .277 by .9081, and express the answer as a decimal.

39. Divide .274 by .0748, and express the answer as a decimal.

SET 25.

1. Find (by Practice) the dividend on £3,780 10s. 0d. at 14s. 9d. in the £.

2. Find the simple interest on £7,240 for $5\frac{1}{2}$ years, at $2\frac{1}{2}$ per cent. per annum.

3. If 51 yards of cloth cost £19 18s. $1\frac{1}{2}$ d., what will 311 yards cost?

4. Reduce 13 tons 17 cwt. 3 qrs. 21 lbs. to oza.

5. Add together $\frac{1}{2}$, $2\frac{1}{2}$, 7, $3\frac{1}{2}$, and $\frac{1}{2}$.

6. Subtract $12\frac{3}{4}$ from $17\frac{1}{4}$.

7. Multiply together $\frac{1}{2}$, $2\frac{1}{2}$, 4, and $\frac{3}{4}$.

8. Divide $8\frac{1}{2}$ by 8.

9. Add together 73·4097, 7·479045, ·709603, 4967·46347, and ·94786054.

10. Subtract 47·9247 from 620·30401.

11. Multiply 40·7941 by 1·476.

12. Divide 1310·4 by ·504.

13. Express 8s. 3d. as the decimal of £66.

14. Find the amount at compound interest of £6,578 10s. 0d. for 3 years at $4\frac{1}{2}$ per cent. per annum, neglecting fractions of a penny.

15. Find (by Practice) the value of 3 lbs. 7 ozs 10 dwts. 12 grains of gold at £3 12s. 6d. per oz.

16. If a gentleman spend 10 guineas every 7 days, and save £100 a year, what is his income?

17. In 476,948 pints, how many quarters, bushels, pecks, &c.?

18. How many inches in 784 furlongs?

19. Reduce 16 acres 2 roods 10 perches 7 yards to square inches.

SET 25.

20. If the railway charge for carrying 12 cwt. for 60 miles costs £2 18s. 0d., what weight can I have carried 15 miles for £2 14s. 4½d.?

21. Find (by Practice) the value of 5 pieces of land, each containing 17 acres 3 roods 10 perches at £175 per acre.

22. At what rate per cent. per annum will £8,022 amount to £9,325 11s. 6d. in 2½ years, Simple Interest.

23. Find the discount on £623 17s. 6d. for 8 years at 3 per cent. per annum.

24. Multiply 19 loads 3 qrs. 2 bushels 3 pecks by 33.

25. Divide an estate of 5,770 acres 1 rood 4 perches by 29.

26. Add together $\frac{1}{11}$, $\frac{1}{8}$, $3\frac{1}{8}$, and $12\frac{1}{8}$.

27. Subtract $9\frac{1}{8}$ from $13\frac{1}{8}$.

28. Multiply together $2\frac{1}{2}$, $\frac{1}{2}$, $3\frac{1}{8}$, and $\frac{1}{2}$.

29. Divide 16 by $6\frac{1}{8}$.

30. What fraction of 1 acre 1 rood is $\frac{1}{2}$ of $\frac{1}{2}$ a rood?

31. Add together 5378·94, 6·03789, 82·50726, 45·6725, and ·30094572.

32. Subtract 9·67924 from 12·127958.

33. Multiply 7·503 by ·30854.

34. Divide ·00768 by ·7263.

35. How many inches are there in 4·275 furlongs?

36. Express ·75 of a ton as the fraction of 4·5 cwt.

37. Find (by Practice) the price of 7,896 sheep at £2 13s. 10½d. each.

38. Find the cost of 7 yards of cloth at £6 0s. 9½d. for 11 yards 2 qrs. 3 nails.

39. Divide an estate of 1,700 acres between 29 farmers, giving to each of two of them 25 acres 1 rood 39 perches more than to any of the others.

SET 26.

1. In 736,984 ozs. how many tons, cwts., &c.?
2. In 476,985 pints, how many loads, qrs. bushels, &c.?
3. Express 17 miles 3 furlongs 4 yards in inches.
4. Find (by Practice) the dividend on £2,067 10s. 0d. at 13s. 7d. in the £.
5. What is the amount of £577 6s. 8d. for $4\frac{1}{2}$ years at $3\frac{1}{2}$ per cent. per annum, Simple Interest.
6. How much tea may be bought for £125 5s. 0d., if 4 lbs. 12 ozs. can be had for £1 3s. 9d.?

7. Add together $4\frac{3}{11}$, $7\frac{2}{33}$, $\frac{9}{10}$, $11\frac{7}{15}$, and $\frac{8}{15}$.
8. Subtract $11\frac{2}{15}$ from $20\frac{4}{15}$.
9. Multiply $4\frac{3}{8}$ by $8\frac{1}{8}$.
10. Divide $7\frac{1}{8}$ by $\frac{1}{2}\frac{1}{8}$.
11. Express $\frac{3}{4}$ of 2 acres 2 roods as the fraction of $11\frac{1}{2}$ of 2 roods.

12. Add together 14.79648206, 9.704, 3069.7, 406.004739.
13. Subtract 1.004376 from 2.00034.
14. Multiply together .004, 73.6, and 1.906.
15. Divide 4.62995124 by 7.503.
16. Express 39 minutes $22\frac{1}{2}$ seconds as the decimal of an hour.

17. If 20 horses draw 40 tons of coals in 9 days, how long will it take 12 horses to do the work?
18. Find (by Practice) the price of 17 cwt. 3 qrs. 14 lbs. of soap, at £1 12s. 8d. per cwt.
19. If the railway fare of 75 cwt. for 25 miles cost 18s. $1\frac{1}{2}$ d., what can I have carried 40 miles for £7 5s. 0d., at double the rate per cwt?
20. Find the principal, from which an amount of £381 17s. 6d. will arise in $3\frac{1}{2}$ years at 5 per cent.
21. If 3 lbs. of green tea equals 5 lbs. of black, and that 70 $\frac{1}{2}$ lbs. of black cost £7 1s. 0d. what will 3 cwt. 3 qrs. 3 lbs. of green tea cost?

SET 26.

22. At what rate per cent. per annum, simple interest, will £7,294 amount to £8,315 3s. 2½d. in 3½ years?

23. Neglecting fractions of a penny, what will £376 12s. 6d. amount to in 3 years at 4½ per cent. per annum, Compound Interest?

24. Find (by Practice) the cost of 13 acres 3 roods 12 perches at £2 17s. 9d. per acre?

25. How many yards of paper 1 foot 8½ inches wide, will paper a room 27 feet long 14 feet wide and 13 feet high?

26. If the digging of a pond containing an Irish acre cost £558 12s. 0d. what will it cost by reducing the size to an English acre?

27. Find (by Practice) the income of a man who pays an income tax of 7½d. in the £. on a property of £218 12s. 0d. yearly.

28. Multiply 17 lbs. 6 ozs. 13 dwts. 17 grs. by 23.

29. A line of railway 101 miles 11 perches in length is to be given in charge to 39 caretakers, of what length must each have the care, so that the line may be equally divided among them.

30. Add together $11\frac{1}{2}$, $13\frac{7}{12}$, $\frac{1}{15}$, $13\frac{1}{2}$, and $1\frac{1}{3}$.

31. From $101\frac{1}{2}$ take $70\frac{3}{4}$.

32. Multiply $19\frac{1}{2}$ by $2\frac{1}{4}$.

33. Divide 7 by $8\frac{1}{2}$.

34. Express $1\frac{1}{2}$ furlongs as the fraction of $\frac{1}{2}$ miles.

35. Add together 0.736, .4900647, 374.3, 59.49476.

36. Subtract 170.3609473 from 171.00432.

37. Multiply together 3.7, .006, and 13.4.

38. Multiply 13.283714 by .884615, and express the answer as a decimal.

39. Divide .04 by .769230, and express the answer as a decimal.

SET 27.

1. Add together $\frac{1}{10}$, $\frac{1}{5}$, $7\frac{1}{2}$, $1\frac{1}{2}$, $12\frac{1}{10}$, and $21\frac{1}{2}$.
 2. Find the difference between $7\frac{1}{2}$ and $7\frac{1}{10}$.
 3. Find the product of $9\frac{1}{2}$, $2\frac{1}{2}$, and $\frac{1}{3}$.
 4. Divide $17\frac{1}{2}$ by $\frac{1}{3}$.
 5. Find the cost of $73\frac{1}{10}$ acres of land at $\$1\frac{1}{2}$ per acre.
-
6. Add together 3·74, 1498·6049732, ·0047, 396·7, and 400·3967.
 7. Subtract 18·7346908 from 90·32064.
 8. Multiply together 1·01, 3·7, and ·0067.
 9. Divide 3·737 into ·0250379.
 10. What decimal of 2·75 oza. is ·125 of 5 oza. 8 drams?
 11. Reduce 2·725 cwt. to oza.
-
12. In 378643 grains how many lbs. oza. drama, &c.?
 13. Reduce 30 milos 3 furlongs 4 yards to feet.
 14. In 7,860 English ells how many yards?
 15. How many flags 2 feet 3 inches long and 1 foot 9 inches broad will cover a court 88 feet 3 inches long, and 36 feet 9 inches broad?
 16. In 4,936,784 square inches, how many roods, perches?
 17. How many suits of clothes each requiring 2 yards 2 nails can be made out of a piece containing 65 yards 3 qrs. 2 nails
-
18. Find (by Practice) the price of 7 bushels 3 pecks 1 gallon at $\$1$ 18s. 9d. per bushel.
 19. What is the cost of 17 barrels 3 stones of wheat at 18s. 4d. per barrel of 20 stones?
 20. If 40 lbs. Troy cost $\$3$ 12s. 0d., what is the price of 90 lbs. Avoirdupois?
 21. If 18 boys do a piece of work in 14 days, in how many days will 15 girls do the same work, 10 girls being equivalent to 7 boys?

SET 27.

22. Find (by Practice) the cost 7,894 pigs at £2 11s. 9½d. each.

23. How many yards of paper 1 foot 10 inches wide will cover the walls of a room 56 feet 10 inches long, 27 feet 6 inches broad, and 15 feet high?

24. How many trees can be planted in a garden of 3 acres 20 perches, if each tree occupies a square whose side is 5 feet?

25. What is the amount of £372 10s. 0d. for 4 years at 3½ per cent. per annum, Simple Interest?

26. Find the simple interest on £672 12s. 6d. for 5 years at 4 per cent. per annum.

27. Find the compound interest on £493 18s. 10d. for 3 years at 4½ per cent. per annum, neglecting fractions of a penny.

28. Find the true discount on £367 8s. 9d. for 5 years at 2½ per cent. per annum, Simple Interest.

29. At what rate per cent. per annum, Simple Interest, will £785 become £926 6s. 0d. in 4½ years?

30. Add together $13\frac{1}{2}$, $7\frac{2}{3}$, $4\frac{3}{5}$, $\frac{1}{2}$, and $1\frac{1}{4}$.

31. Subtract $11\frac{3}{5}$ from $17\frac{2}{3}$.

32. Multiply together $\frac{2}{3}$, $1\frac{1}{2}$, and $\frac{1}{4}$.

33. Divide $6\frac{1}{2}$ by $1\frac{1}{4}$.

34. Divide 100 yards 2 qrs. 1½ nails by $39\frac{1}{2}$.

35. Add together 13·97643, ·00917, 4·96, 31·7049631, 4789, and ·2406.

36. Subtract ·974326 from 1·8204.

37. Multiply 139·7364 by 18·749.

38. Divide ·03487 by ·0498 to four decimal places.

39. Reduce 17 perches to the decimal of an acre, and divide the result by ·125.

SET 28.

1. Find the amount and compound interest of £493 12s. 1d. for 2 years at $4\frac{1}{2}$ per cent. per annum.
2. Find the present worth of £1,009 3s. 4d. lent for $3\frac{1}{2}$ years at $2\frac{1}{2}$ per cent. per annum, Simple Interest.
3. Find the amount of £189 12s. 0d. for 5 years at 4 per cent. per annum, Simple Interest.
4. If 17 stones of oats cost 14s. 10 $\frac{1}{2}$ d., what is that per pound?
5. What is the cost of 42 gallons of sherry, if 16 gallons of port are worth £9 12s. 0d., 3 gallons of port being worth 4 gallons of sherry?

6. Express 17,496,395 gills in loads, qrs., bushels, &c.
7. In 73,964 inches, how many fathoms?
8. Reduce 47 acres to feet.
9. Divide £61 0s. 9 $\frac{1}{2}$ d. by 17.
10. How many times may 3 lbs. 2 ozs. 2 scruples be taken from 53 lbs. 11 ozs. 3 drams 1 scruple?
11. How much will pay for 720 English ells, if 500 French ells cost £315 12s. 6d.?

12. Add together $7\frac{1}{2}$, $13\frac{1}{2}$, $\frac{1}{2}$, $17\frac{1}{2}$, and $20\frac{1}{2}$.
13. From $90\frac{1}{2}$ take $89\frac{1}{2}$.
14. Multiply together $13\frac{1}{2}$, $\frac{1}{2}$, and $1\frac{1}{2}$.
15. Divide $\frac{3}{4}$ of $\frac{1}{2}$ by $\frac{1}{2}$.
16. Simplify the expression: $\frac{\frac{3}{4} + 1\frac{1}{2}}{1\frac{1}{2} + 2\frac{1}{2}}$.
17. Express $\frac{1}{2}$ of 2 lbs. 8 ozs. as the fraction of $\frac{1}{2}$ of 1 cwt. 14qr. 20 lbs.

18. Add together 406·9, 17·00096, 4000·906, ·006987, ·4739461.
19. From ·0732943 take ·06498769.
20. Multiply together 174·96, ·0039, and ·02.
21. Divide, to four decimal places, 1·74963 by 2·947695.
22. What decimal of ·375 tons is ·125 of 3 cwt.?

SET 28.

23. If $17\frac{1}{2}$ lbs. of tea cost £2 19s. $9\frac{1}{2}$ d., what is the price of 3 chests, each weighing 1 cwt. 17 lbs.?

24. If 90 gallons of pure wine cost £63, what will be the price of 70 gallons of a mixture of which two parts are water and seven wine?

25. Find (by Practice) the price of $7,896\frac{1}{2}$ yards of cloth at 11s. $7\frac{1}{2}$ d. per yard.

26. In what time at $3\frac{1}{2}$ per cent. per annum, Simple Interest, will an amount of £420 8s. $7\frac{1}{2}$ d. be produced from a certain principle, and £47 13s. $7\frac{1}{2}$ d. interest?

27. Subtract 17 years 13 weeks 4 days 14 hours from 30 years 2 days 12 hours.

28. How many periods of 2 years 3 weeks 5 days are contained in 35 years 11 weeks 1 day?

29. Find (by Practice) the rent of 78 acres 3 roods 27 perches at £2 13s. 10d. per acre.

30. Add together $9\frac{2}{10}$, $13\frac{4}{11}$, $15\frac{3}{3}$, $20\frac{2}{3}$, and $8\frac{7}{10}$.

31. From $67\frac{2}{3}$ take $59\frac{5}{6}$.

32. Multiply the sum of $2\frac{1}{2}$ and $5\frac{1}{2}$ by their difference.

33. Divide $11\frac{2}{3}$ by $\frac{1}{3}$.

34. In $79\frac{1}{2}$ miles how many lengths of $\frac{1}{16}$ furlongs?

35. Add together 409·7, 3·409, ·009736, 406, ·0111, and 17·40609.

36. Subtract 34·0937648 from 40·032.

37. Multiply 794·0096 by ·3769.

38. Multiply ·0064 by 6·249, and express the answer as a decimal.

39. Divide 9·3625 by 5·69, and express the answer as a decimal to six places.

SET 29.

1. Add together $7\frac{1}{10}$, $12\frac{1}{2}$, $1\frac{1}{2}$, $14\frac{1}{2}$, and $1\frac{1}{2}$.
 2. Subtract $9\frac{1}{2}$ from 12.
 3. Multiply together $1\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$.
 4. Divide $16\frac{1}{2}$ by $8\frac{1}{2}$.
 5. Add together $\frac{1}{2}$ tons, $2\frac{1}{2}$ cwt., and $3\frac{1}{2}$ qrs., and express the result in cwt., &c.
-
6. Add together 4·706, 397·4, 365·493249, 16, and 1746·93.
 7. Subtract 49·8674329 from 100·324176.
 8. Multiply together 49·76, 13·4, and ·007.
 9. Divide ·3 of 7·469 by 1·7 of 14·5 to four decimal places.
 10. Find the value of ·7 of 5 lbs. — ·375 of 12 ozs. Expressing the Answer in lbs., ozs., and drams.
-
11. If a field of 80 acres is to be ploughed in 10 days, and that 15 horses plough 50 acres in 4 days, how many horses will finish the remainder within the time?
 12. How much money will 12 men earn in 25 days, if 32 men earn £80 in 20 days?
 13. Find (by Practice) the cost of an excavation 78 feet long, 37 feet broad, and 14 feet thick, at 3s. 10½d. per cubic yard.
 14. Subtract $3\frac{1}{2}$ half guineas from 37 half crowns.
 15. Find (by Practice) the cost of making a railroad 17 miles 3 furlongs 85 perches long, at £1,769 10s. 0d. per mile.
 16. If 7 cwt. 5 lbs. of soap cost £4 2s. 2½d., what is the price of 3 stones 10 lbs. of the same article?
-
17. In 7,846,983 ounces, how many tons, cwt., qrs., &c.?
 18. Reduce 193 miles 3 furlongs 4 yards to inches.
 19. Express 43,698,473 pints as loads, qrs., bushels, &c.
 20. How many plots, each containing $30\frac{1}{2}$ perches, can be had out of a piece of land containing 4 acres 1 rood $15\frac{1}{2}$ perches?
 21. In 7,894 fathoms, how many miles, furlongs, &c.?
 22. If 300 Flemish ells of cloth cost £19 1s. 3d., what will 400 French ells cost?

SET 29.

23. Add together $3\frac{7}{8}$, $14\frac{4}{5}$, $\frac{1}{5}$, $43\frac{4}{5}$, and $17\frac{7}{8}$.
 24. Subtract $43\frac{1}{8}$ from $70\frac{3}{4}$.
 25. Multiply $1\frac{3}{4}$ by $1\frac{1}{11}$.
 26. Divide $4\frac{3}{4}$ by $9\frac{1}{11}$.
 27. Add together $\frac{1}{4}$ of a mile, $\frac{1}{4}$ of a furlong, and $\frac{1}{4}$ of a perch, expressing the answer in furlongs, perches, &c.
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28. Add together 7.39, 406.3097, 4069.4096732, 6.0097, and .04329.
 29. Subtract 16.97324 from 21.3421.
 30. Multiply together 3.06, .0097, and 3.4.
 31. Divide to four decimal places .7349 by .00694.
 32. What decimal is .169 of 2 qrs. 6 lbs. 8 ozs. of .5 of 1 qr. 3 lbs. 4 ozs.?
-

33. Find the amount of £367 12s. 6d. for 4 years at $4\frac{1}{2}$ per cent. per annum, Simple Interest.
34. Neglecting fractions of a penny, what is the compound interest of £864 13s. 10d. for 3 years, at $2\frac{1}{2}$ per cent. per annum?
35. In what time will £3,875 amount to £4,214 1s. 3d. at $3\frac{1}{2}$ per cent. per annum, Simple Interest?
36. What sum lent at 4 per cent. for $4\frac{1}{2}$ years, will amount to £435 8s. 4d., Simple Interest?
37. Find (by Practice) the cost of 34 acres 3 roods 12 perches at £2 17s. 9d. per acre.
38. How much tea can be had for £144 18s. 8d., if 2 qrs. 4 lbs. 3 ozs. can be had for £13 3s. 6d.?
39. Find the cost of repairing a road 2 miles 3 furlongs 17 perches long, at 2s. 7d. per perch.

SET 30.

1. How many barrels of flour, at £1 11s. 6d. per barrel, can be had for 700 stones of wheat at 1s. 9d. per stone?

2. Find (by Practice) the cost of 786 horses at £12 14s. 10d. each.

3. If 18 men build a house in 12 days, in how many days will 30 men do it, the former working 10 hours, and the latter 9 hours per day?

4. How long will 8 men take to dig a trench which 14 men can dig in 6 hours and 40 minutes?

5. Find the cost of papering a room 27 feet long, 16 feet 6 inches broad, and 12 feet high, the paper being 2 feet 3 inches wide, and costing 2s. 11½d. per dozen yards.

6. What will be the price of 17 yards 3 nails of silk at 13s. per yard?

7. Add together $8\frac{2}{3}$, $14\frac{7}{12}$, $3\frac{1}{2}$, $\frac{1}{2}$, and $1\frac{1}{3}$.

8. Subtract $79\frac{1}{2}$ from $80\frac{1}{4}$.

9. Multiply together $\frac{1}{2}$, $3\frac{2}{3}$, and $1\frac{1}{2}$.

10. Divide $\frac{1}{2}$ of $\frac{2}{3}$ by $\frac{1}{4}$.

11. Find the fourth proportional to the sum, product, and quotient of $\frac{2}{3}$ and $\frac{1}{4}$.

12. What fraction of $\frac{2}{3}$ of 4 cwt. 1 qr. 24 lbs. is $\frac{1}{2}$ of 1 cwt. 1 qr. 10 lbs.

13. Add together .0698, 30.74, 2076.940635, .00473296, 1.09 400.06.

14. Subtract 186.4392876 from 200.173064.

15. Multiply 367.495 by 17.98.

16. Divide .73 of 6.4739 by 3.69 to four decimal places.

17. Express .069 of 28 acres 1 rood as the decimal of 4 acres.

18. Find the value of £.75 + 3.125 crowns + 17.875 shillings — .5 of 7 half guineas. Express the result in shillings and pence.

SET 30.

19. In 478,640 grains, how many lbs., ozs., &c.?
20. Express 43 acres 30 perches in square inches.
21. Express 35,698 grains in lbs., ozs., drams, scruples, &c.
22. How many pints in 784 qrs. 3 pecks?
23. How many labourers can be paid out of a sum of £36 18s. 8½d., each labourer receiving 17s. 10½d.?
24. How many coins of 7s. 6½d. each, can be got for 3,184 guineas and 5d.?

-
25. Find the compound interest of £376 12s. 10d. for 3 years at 4½ per cent. per annum, neglecting fractions of a penny.
 26. Find (by Practice) the cost of flooring a room 29 feet long and 17 feet broad, at 5½d. per square foot.
 27. Find (also by Practice) the cost of 48 miles 3 furlongs 15 perches of a road at £170 12s. 6d. per mile.
 28. At what rate per cent. per annum, Simple Interest, will £397 10s. 0d. amount to £484 19s. 0d. in 4 years?
 29. If 1 lb. 5 scruples cost £2 2s. 8½d., what will be the cost of 3 lbs. 2 ozs. 4 drams?
 30. How much money will be earned by 16 men in 18 days if 27 men earn £47 5s. 0d. in 12 days?

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31. Add together $7\frac{2}{5}$, $12\frac{1}{4}$, $4\frac{7}{8}$, $\frac{2}{5}$, and $3\frac{7}{8}$.
 32. Subtract $14\frac{1}{4}$ from $19\frac{1}{4}$.
 33. Multiply $13\frac{1}{2}$ by $1\frac{2}{3}$.
 34. Divide $13\frac{1}{2}$ by $3\frac{1}{4}$.
 35. Express $\frac{2}{3}$ guineas as the fraction of a £.

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36. Add together 13·743, ·0476985, 4000·6, 39·87. and ·00693471.
 37. Subtract 78·463298 from 79·37428.
 38. Multiply 11·07 by ·0726½, and express the ans. as a decimal.
 39. Divide ·75681 by ·2724½, and express the answer as a decimal to six places.

The following 5 pages, consisting of classified questions throughout the commercial rules, are intended to test the knowledge of pupils who have worked through the whole or part of the Elementary Papers. By assigning a different sum, in the same section, to each pupil the vice of copying will be prevented, and as the problems are of about equal difficulty, the relative, as well as the absolute, knowledge of the pupils may be thus tested.

1. From £7040 8s. 6½d. take £304 11s. 6½d.
 2. Take 8 cwt. 2 qrs. 4 lbs. 11 oz. from 2 tons 1 qr. 7 lbs.
 3. Take 14 years 30 days 12 hours 10 minutes from 20 years 15 hours
 4. From 18 loads 3 bushels. 1 gallon take 2 loads 2 pecks 5 pints.
 5. From 40 lbs. 3 ozs. 8 grs. take 2 lbs. 4 ozs. 6 dwts. 12 grs.
 6. From 9 acres 2 roods 10 yds. take 4 acres 21 per. 20½ yds.
 7. From 201 miles 2 fur. 10 per. take 7 fur. 4 yds. 2 ft. 7½ in.
 8. Take 7 lbs. 3 ozs. 6 drs. 2 scr. from 12 lbs.
 9. Take 7½ half-crowns from seven half guineas.
 10. Take 2s. 7½d from a guinea.
-
11. Multiply 6 acres, 3 roods, 10 perches by 278.
 12. Multiply £7049 11s. 6½d by 89.
 13. Multiply 18s. 6½d. by 78½.
 14. Multiply £3 18s. 9d. by 18½.
 15. Multiply 9 miles 8 fur. 2 per. 4 yds. by 57.
 16. Multiply 17 acres 3 roods 11 per. by 72.
 17. Multiply 5 weeks 4 days 18 hours by 14½.
 18. Multiply 14 lbs. 10 ozs. 11 dwts. 10 grs. by 27.
 19. Multiply 78 cwt. 3 qrs. 10 lbs 14 ozs. by 78.
 20. Multiply 7 bushels 3 pks. 1 gal 2 pints by 19.
-
21. Reduce 5 acres 3 roods 10 yards to square inches.
 22. In 78 loads 3 qrs. 4 bushels how many pints?
 23. In 78 yards 3 qrs. 2 nails how many inches?
 24. In 540 yards how many ells?
 25. Reduce 3 miles 2 furlongs 4 yards to fathoms.
 26. Reduce 17 tons 14 cwt. 3 qrs. 10 lbs. to ounces.
 27. Reduce 78 guineas 13s. 10½d. to farthings.
 28. Reduce 78 qrs. 3 lbs. 10 ozs. to drams.
 29. Reduce 3 miles 4 furlongs 2 yards to inches.
 30. Reduce 7 lbs. 11 ozs. 4 dwts. 19 grains to grains.
-
31. How many acres, &c., are there in 3408112 square feet?
 32. In 1970992 ozs. how many tons, cwts., &c.?
 33. How many half guineas in 1579284 half crowns?
 34. In 1728550 pints how many quartens, &c.?
 35. Reduce 21349936 gills to loads, qrs., bushels, &c.

36. In 9780 French ells how many English ells?
37. In 96396988 farthings how many guineas, &c.?
38. In 167892 inches how many fathoms?
39. In 39049422 seconds how many weeks, days, &c.?
40. Reduce 1670992 grains, to lbs., ozs., dwts.

41. Divide 953 lbs. 9 ozs. 4 dwts. by 78.
42. Divide 3412 acres 3 roods by 730.
43. Divide 249 into 120 tons 3 cwt. 1 qr. 5 lbs.
44. Divide 1672 tons 0 cwt. 3 qrs. 24 lbs. 12 ozs by 156½.
45. Divide £1999 19s. 5½d. equally between 58 persons.
46. Divide 28 tons 6 cwt. 2 qrs. by 11.
47. Divide £143095 19s. 4½d. by 927.
48. How often does 36 yards contain 2 yds. 1 qr.
49. Divide 53 cwt. 2 qrs. 14 lbs. by 4½.
50. Divide 142 lbs. 8 ozs. 1 dwt. 18 grs. by 29.
51. Divide 300 bushels 3 gallons 3 pints by 87.
52. Divide 403 lbs. 9 ozs. 15 dwts. 7 grs. by 23.

53. If 6 lbs. 10 ozs. of tea cost 13s. 3d. what is that for 1 stone 2 lbs.?
54. What is the cost of 9 bushels and 2 pecks of oats at 13s. 10½d. for 1 qr. 2 pecks?
55. What is the price of 3 barrels 10 stones of wheat, if 9 barrels cost £11.16s. 10½d. (20 stones to the barrel.)
56. If 6 men do a piece of work in 12 days how long will 8 men take to do it?
57. At £7 8s. 6d. for 15 cwt. 3 qrs. 18 lbs. of flour what is the price of 13 stones 9½ lbs.?
58. If a man walk 40½ miles in 13½ hours how long will he be walking 28½ miles?
59. Find the number of horses that will plough 15½ acres when 45 horses can plough 34½ acres.
60. Find the cost of 35 acres 2 roods at £2 15s. 5d. for 2 acres 1 rood and 20 perches.
61. What is the cost of 157 stones 8 lbs. of tea if 2 cwt. cost £20 6s.?
62. How much tea can be bought for 12½ guineas if 42½ lbs. are worth £17 17s.?
63. If the 7d. loaf weighs 8½ lbs. how many ounces of bread can I purchase for 1½d.?
64. Find the cost of 87 gals. 2 qts. of rum at £2 12s. for 6 gals. 1 qt.
65. What is the price of 13 barrels 4 stones 7 lbs. of flour at 10s. 11½d. for 7½ stones?

Find the true present worth of each of the following bills under the specified conditions :—

117.	£1185	15	0	due 8 years hence at 3 per cent. per annum.
118.	1837	6	3	" 6½ " " 3 " "
119.	435	18	9	" 4 " " 6 " "
120.	614	8	9	" 4 " " 3½ " "
121.	311	8	9	" 3 " " 8 " "
122.	1101	11	3	" 5 " " 3½ " "
123.	£2891	due 2 yrs. 7 months hence at 4 per cent. per annum.		
124.	5847	" 3 yrs. 10 months	" 5	" "
125.	694	" 35 weeks 4 days	" 7	" "
126.	756	" 2 yrs. 330 days	" 4	" "
127.	164	" 1 yr. 76 days	" 5	" "
128.	976	" 192 days	" 6½	" "

Find the true discount on each of the following bills :—

No.	Bills	Drawn	Rate per Cent.	Time.	Paid.
129.	£ 785 12 6	4th April	5	9 months	3rd July
130.	496 17 10	3rd May	6	5 "	4th June
131.	147 14 5	6th May	5	137 days	15th June
132.	753 11 6	12th June	4	169 "	29th July
133.	740 8 4	13th June	6	10 months	14th August
134.	693 1 5	14th July	5	7 "	1st Sept.

AVERAGES AND PERCENTAGES.

A.

1. A sum of £50,000 is to be divided amongst a mother, son, and two daughters. The son gets 40 per cent. of the whole, the daughters 35 per cent. between them, but the elder receives £2,000 more than the younger, the residue falls to the mother; what are the several shares, and what per centage of the son's share is the mother's portion?

2. Divide £3,635 between two men, so that the share of one will be but 40 per cent. of the share of the other.

3. The registered tonnage of steamships in the United Kingdom in 1858, was as follows:—England 330,876 tons, Ireland 35,626 tons, Scotland 84,846 tons; what is the average tonnage for the United Kingdom, and what per cent. do those of Ireland and Scotland respectively bear to that of England?

4. A trader buys a hogshead of whiskey at 17s. 9d. per gallon, and a pipe of a different sort at 18s. 3d. per gallon; after mixing the two whiskeys, he desires to know at what rate per gallon he must sell the liquor so as to clear \$8 13s. 3d. carriage, and the usual profit of 10 per cent on the whole outlay.

5. The population of Ireland in 1831 was 7,767,401, in 1841 it was 8,175,124, in 1851 it was 6,551,970; find the average increase per cent. per annum in the first decade, and the average decrease per cent. per annum in the second decade. Express each answer true to five decimal places.

B.

1. A vintner mixes 5 gallons of wine at 15s. 6d. per gallon, with 3 gallons at 15s. 10d. per gallon, and has to sell the mixture at a loss of 10 per cent.; find the selling price per gallon.

2. In how many years will the true discount on a bill of £477 9s. 4½d. be \$64 19s. 4½d. at 4½ per cent. per annum?

3. The population of three cities in 1840 were 78,946, 50,431, and 69,358. In 1850 they had respectively 80,047, 47,264, and 72,968; find the gain or loss per cent. on each, and the gain or loss per cent. on the whole.

4. In 1867 the receipts of a railway company were £30,000, and in each of the four succeeding years the receipts increased 10 per cent. on the year immediately preceding, find the average receipts each year, and the per centage which the first year's receipts are of the average yearly receipts.

5. What will be the average age in a school of 90 children in which the boys are to the girls as 5 : 4; half the boys and one-fourth of the girls are 10 years, one-fifth of the boys and half the girls are 12 years, and the remainder of both sexes are 15 years?

C.

1. A clerk's salary is irregularly progressive, and his average yearly income from 1858 to 1868, both included is £80. In 1858 his salary was £5 less, and in 1869 £17 more than the average; find his average income from 1859 to 1869, both included.

2. A man invests £6,000 in the $3\frac{1}{2}$ per cents. at $89\frac{1}{2}$, and sold out a third of the stock when they fell to $81\frac{1}{2}$, and on a farther fall to $72\frac{1}{2}$ gets rid of the remainder. He now invests the entire purchase-money in a company whose shares sell at $49\frac{1}{2}$, and on their rising to $60\frac{1}{2}$ sells out. Find how these transactions affect his capital, $\frac{1}{2}$ per cent. brokerage being allowed in every transfer of the stock.

3. Two horses, A and B, run a race, A finishes in 10 minutes, of which he was delayed $1\frac{1}{2}'$ by a fall; meanwhile B, running at the rate of 15 miles an hour, reaches the winning post at the same time as A. Find the length of the race, and the average rate per hour of A while actually running.

4. The Treasury Returns issued on 8th November, 1870, show the national receipts for past year, from the following sources, to be as follow:—Customs £11,817,000, Excise £12,418,000, Stamps £52,500, Taxes £802,000, Income Tax £15,300, Post Office £241,000. Find the average on the whole. Find also the percentage which the receipts of this year bear to those of last year, they being respectively £36,395,623, and £40,521,063.

5. A merchant buys 16 cwt. of butter at £3 17s. 6d. per cwt., and 44 cwt. at £4 per cwt., at what rate per cwt. must he sell it so as to make 10 per cent profit on the whole?

D.

1. What sum should I invest in the $3\frac{1}{2}$ per cents. at $94\frac{1}{2}$, so that after paying an income-tax of 9d. in the £, my income may amount to £385?

2. At what rate per cent. per annum will the simple interest on £210 in $1\frac{1}{2}$ years be as much as that on £840 at $2\frac{1}{2}$ per cent. per annum for half a year?

3. An express train travelling 50 miles an hour leaves London for Holyhead, a distance of 300 miles, at six o'clock; what should be the average rate of travelling per hour of a slow train that leaves London four hours earlier, so that it may arrive in Holyhead half-an-hour before the express?

4. The average age of 50 soldiers is $27\frac{1}{4}$, the average age of 15 of them is $22\frac{1}{2}$, and of 20 others $23\frac{1}{2}$. Find the average age of the remainder.

5. What quantity of tea, at 2s. 3d. per pound, must I mix with 1 cwt. at 3s. 0d. per pound, so as to average 2s. 9d. per pound?

E.

1. A rectangular kitchen garden which contains an acre, and has its length 121 yards, is to be edged with 161 fruit trees; what must be the average distance between each?

2. In 1867 a farmer raised 240 barrels of corn, and sold it at 18s. 6d. per barrel; in 1868 200 barrels, and sold it at 21s. 6d. per barrel; in 1869, 270 barrels, which fetched 16s. 0d. per barrel. Find the average sum produced each year.

3. Having invested £4,800 in the 3 per cents. at 72, I desire to know what sum I must invest in the $3\frac{1}{2}$ per cents. at 89, to produce an income seven times as large as that derived from the first investment.

4. Shares which pay a dividend of 2s. 6d. each yield $7\frac{1}{2}$ per cent.; what should be the gain per cent. on each share to pay a dividend of 8s. 6d.?

5. A house which produces a rent of £345 9s. 0d. is sold for £8,636 5s.; what per cent. will the purchaser have for his money by raising the rent 25 per cent.?

F.

1. A merchant sold 15,000 yards of cloth in four months. In the first month he sold 4,000 yards, in the second 22 per cent. of the remainder, and in the third month 3,580 yards; what percentage of the four months' sales was sold in the fourth month?

2. A regiment is composed of 986 men of whom 6 are beyond 60 years: of the remainder 5 per cent. are between the ages of 50 and 60 years; 131 are between 40 and 50 years; 30 per cent. are between the ages of 30 and 40 years; 123 are under 20 years; the rest are between the ages of 20 and 30 years; what percentage of the regiment are between the last mentioned limits?

3. A merchant insures a cargo with a company who charges £2 12s. 6d. per cent.; what will be the sum assured if the premium charged is £262 10s. 0d.?

4. A railway train travelling $7\frac{1}{2}$ hours performs a journey of $73\frac{1}{2}$ miles in two hours, 80 miles in three hours, and $46\frac{1}{2}$ miles in the remainder of the time; express to two places of decimals the average rate per hour travelled during the journey.

5. What per hour must be the average rate of travelling of a man who in $10\frac{1}{2}$ hours walks round a square containing 110 square miles 160 acres?

A.*

The following are the most difficult questions on Scales of Notation set at various Examinations within the past 3 years. The Author thinks they will be considered important by intending Candidates.

1. Divide 418·966 by 6·289 in the duodenary scale of notation ; reduce 296·7 from the duodenary to the denary scale ; and find the value in decimals of $\frac{1}{15}$ in the scale of 7.
2. Extract the square root of 35400544 in the scale 6 ; transform 3065·263 from the scale of 8 to that of 10 ; and reduce $\frac{1}{14}$ from the scale of 10 to a duodecimal fraction.
3. Transform 275·9375 from the decimal to the duodenary scale of notation ; multiply 432 by 234 in the scale of 5 ; and extract the square root of 148915 in the scale of 11.
4. State the rule for transforming a number from one scale of notation to another. Transform 45678 from the scale of 9 to the scale of 11.
How many times is the greatest number of three figures in the scale of 4 in the greatest number of four figures in the scale of 8 ?
5. The number 113140331 is in the scale of 7. Conduct the operation of finding its cube root in that scale.
6. Multiply 43620 by 265 in the scale of 7, and reduce 16325130 from the scale of 7 to the scale of 12. Extract the square root of 553416204 in the scale of 8.
7. Reduce the denary number 16784 to the duodenary scale : divide 42494 by 871 in the scale of 11 ; and find the number in the scale of 4 which when divided by 3 gives the quotient 133.
8. Reduce the denary numbers 7384 and 51·27 to the duodenary scale, and divide the former by the latter in that scale.
9. Change the numbers 180 and 150 from the scale of 10 to that of 7, and in the latter scale find their product and its cube root.
10. The number of square inches in a square plot of ground is represented in the undenary scale by the sequence 222950135 ; how many acres, roods, perches, &c., does it contain ?
11. The number 324 expressed in a different scale becomes 40101. What is the radix of the scale ?
12. The numbers 1184323 and 589 are expressed in the duodenary scale ; divide the former by the latter in that scale.
13. Multiply 1 t 7 by 2 t 6 in the duodenary scale, and prove the answer by reducing the multiplicand, multiplier, and product to the denary scale.
14. Transform 17,400 from the denary to the duodenary scale ; and find the square of it in the duodenary scale.
15. Extract the square root of 105404'440241 in the scale of 6, and express the result in the duodenary scale.
16. Find the number in the scale of 12, which is equal to 22,161 in the scale of 10. Divide 55,974 by 67 in the scale of 11, and square 123 in the scale of 4.

B.*

1885.—Time allowed, 3 hours.

1. Add together $5\frac{7}{14} 14385$ of 12 cwts. 3 qrs. 14 lbs. and $4\frac{330769}{11}$ of 11 cwts. 2 qrs. 19 lbs.; and reduce the result to the decimal of 140 tons 11 cwts. 1 qr. 15 lbs.

2. Find, by duodecimals, the volume of a block of granite 45 ft. 8 in. long, 19 ft. $1\frac{1}{2}$ in. wide, and 6 ft. 9 in. deep; and reduce the result to cubic yards, feet, and inches.

What is the value of the block at £1 16s. 0d. per cubic yard?

3. Find the square root of 231496225.

The length of a rectangular estate is 6 fur. 15 po. $1\frac{1}{2}$ yds., and the breadth 4 fur. 17 po. $1\frac{1}{2}$ yds.; find the area in acres, roods, poles, &c.

What would be the length of the side of a square of equal area?

4. A's income is $\frac{1}{2}$ of B's income; A's expenditure is $\frac{1}{3}$ of B's income; B's expenditure is equal to the whole of A's income. Show that each has the same sum left.

5. On Scales, No. 5, page 70.

6. If the simple interest on £3,138 3s. 6d. exceeds that on £2,762 13s. 6d. by £7 0s. 8d. in three months, what is the rate of interest per cent. per annum?

7. The diameters of four spheres are to one another as 3:75:5:6:25:7:5; and the volumes of spheres vary as the cubes of their diameters; prove that the greatest of these four spheres is equal to the other three together.

8. On Scales, No. 6, p. 70.

9. A person holding £4,205 two and a half per cent. stock, calculates that by selling at 84 and investing the proceeds in five per cent. debentures at the current price he will improve his income by £63 1s. 6d.; what is the price of the debentures?

He has omitted to observe that he will have to pay $\frac{1}{2}$ per cent. (calculated on the par value) as brokerage on each transaction; having this to pay, what actual improvement in income will he obtain?

10. Find the compound interest on £2,150 for three years at 5 per cent.

A company obtain a loan from their bankers of £2,150 at 5 per cent.; they do the same a year afterwards, and again a year after that; what will their whole debt be at the end of the third year, allowing compound interest on the first two loans?

11. Find the present value of a bill for £8,433 3s. 4d., due three months hence, the rate of interest being $3\frac{1}{2}$ per cent. per annum.

A person, holding such a bill, disposes of it through an agent at the reduced rate of £100 for £106 $\frac{1}{2}$ of the nominal value, and the agent charges a commission of $\frac{1}{2}$ per cent. on the purchase money. What does the person receive?

12. A poor-rate of £1,178 2s. 6d. is voted by the guardians in a union consisting of three parishes in which the number of ratepayers is 150, 100, and 75 respectively; find the portion of the rate which must be contributed by each parish (1) if the average sum to be paid by each ratepayer is the same in each parish; (2) if the average varies as 2:3:4 respectively.

13. A speculator gains 15 per cent. on half his capital, and loses $7\frac{1}{2}$ per cent. on the other half, in the first six months of the year; he then invests the whole with the balance of profit already made, and in two months has lost 10 per cent. of it; after that he makes $12\frac{1}{2}$ per cent. on the residue by the end of the year; find his whole gain or loss per cent. by these transactions.

14. The weight of a gold 10-franc piece is 49.78 grms.; the weight of a silver 5-franc piece is 385.3 grms., of which the equivalent in pure silver is .782 oz. Troy. If the relative value of coined gold and silver be 19:29:1, find the intrinsic value of a gold 10-franc piece, the intrinsic value of pure silver being 4s. 2d. per oz. Troy.

15. A and B undertake to do each one-half of a piece of work; A begins at 9 a.m., B at half-past 10, and both stop at 12, having then done one-third of the work between them; they resume work at 1 p.m., and A finishes his share at 4 o'clock; when will B have finished?

C.*

Excise.

1885.—Time allowed, 3 hours.

1. Extract the square root of $4'24027$; and find a number whose square is equal to the difference between the squares of 8,467 and 4,683.

2. From $\frac{3}{4}$ of $\frac{3}{4}$ of 192 subtract $\frac{1}{11}$ of $34920\frac{1}{2}$.

3. A rectangular tank is 37 ft. 5 in. 6 pts. long, and 22 ft. 7 in. 8 pts. wide, and has a volume of 329 cubic yds. 21 ft. 273 in. Find (1) by duodecimals the area of the bottom, (2) the depth of the tank, and (3) the cost of lining the four sides at one shilling per square foot.

4. Find the cube root of 52'734375 and of $2'370$.

5. If 5 per cent. is gained by selling sugar at $5\frac{1}{2}d.$ per lb., what is the cost price per cwt., and what would the gain per cent. be if 3 cwt. 2 qrs. 26 lbs. 4 oz. were sold for £10 9s. $1\frac{1}{2}d.$?

6. At what rate of interest per cent. per annum will £769 10s. 10d. amount to £780 1s. 8d. in 100 days?

7. If I invest £5,075 in the 3 per cent. stock at $90\frac{1}{2}$, and pay $\frac{1}{2}$ per cent. brokerage, what income shall I obtain? And if after holding the stock for a year I sell it at $91\frac{1}{2}$, again paying brokerage at the same rate as before, by how much will my capital be increased, and what rate of interest shall I have made on my investment?

8. On Scales, No. 7, page 70.

9. If a train 90 yards long, going 40 miles per hour, meets another train going 35 miles per hour, and they pass one another in $4'8$ secs., what is the length of the other train? And how long would the faster train have taken to pass the other if they had been going in the same direction?

10. A piece of metal measuring 1 ft. 4 in. by $10\frac{1}{2}$ ins. by $3\frac{1}{8}$, being melted down, how many cubes $2\frac{1}{2}$ ins. each way, can be cast out of it, and how many $\frac{1}{16}$ ins. in each way can be made out of what is left?

11. Three persons, A, B, and C, jointly own an estate, their shares being $4, 2\frac{1}{2}, 1\frac{1}{2}$. A sells half his share to C, and C sells 100 acres to B, and their shares are then equal. How many acres was each entitled to at first?

12. A person entitled to £2,877 10s. $1\frac{1}{2}d.$ in $2\frac{1}{4}$ years time discounts his expectation at $7\frac{1}{2}$ per cent., compound interest, what is the estimated present value?

13. A Gunter's chain consists of 100 links, and an acre equals 10 square chains. Find the area in acres, rods, and perches, of a field which is 26 chains 25 links long, and 16 chains 5 links wide.

14. A stone pillar in the shape of a cylinder of 3 ft. diameter, with the top rounded into a hemisphere, is found to weigh exactly twice as much as a sphere made of the same sort of stone, and of 6 ft. diameter. What is the height of the pillar (volume of a sphere = $\frac{4}{3} \times$ the circumscribing cylinder.)

15. The following curious problem was given at an Excise examination. For solution, see Key:—"Saturday, December 31st, 1870, was the last of 40,000 consecutive days; find the year, month, day of the month, and day of the week, on which the first of the said 40,000 days fell."

16. If 5 oxen or 7 horses eat up a field of grass in 87 days, how long will same grass feed 2 oxen and 3 horses?

D.*

POST OFFICE FEMALE CLERKSHIPS.

1885.—Time allowed for 12 questions, $1\frac{1}{2}$ hours.

1. Prove that if a number measure each of two other numbers, it will also measure their sum or difference, and also any multiple of either of them. Find the greatest common measure of 1445, 595, 408, and 4012.

2. Find the value of $\frac{1}{2}$ of $\frac{1}{3}$ + $\frac{\frac{1}{2} + \frac{1}{3}}{4\frac{1}{2}}$ + $\frac{125}{128} \times (1 + \frac{1}{2})$.

3. Simplify $\frac{\frac{1}{2} + 2\frac{1}{2}}{1475 - \frac{1}{2} + 1\frac{1}{2}}$ and express the answer in decimal form.

4. Express $\frac{7}{10}$ of 3s. 9d. + $\frac{135}{100}$ of 6s. 2d. + $\frac{263}{100}$ of £3 15s. as the decimal of £9 8s.

5. Find the square root of '0064 and of 6'249.

6. Which of the three ratios is the greatest, 11:17, $1\frac{1}{2}:2\frac{1}{2}$, or '75:'96? (Show the calculations from which your answer is obtained.)

7. The sum of £6,600 was divided between A, B, and C, so that A's share was half as great again as B's share, and twice as great as that of C. How much did each receive?

8. If 8 horses require as much corn as 14 ponies, and 20 quarters last 15 ponies for 56 days, how long will corn costing £64 last 32 horses if the price is 15 shillings per quarter?

9. Find the present worth of £4,320 due 11 months hence at 6 per cent. per annum.

10. The difference between the simple and compound interest on a certain sum of money at 4 per cent. interest would be £3 4s. in two years. What is the sum?

11 and 12. On Stocks and Profit and Loss. Both easy.

1. What is meant by the "least common multiple" of several numbers? Find in factors the least common multiple of 67,925; 51,870; 46,585; 37,225.

2. The metre contains 39'37 inches. Find how many square inches there are in 101'1 square decimetres.

3. Simplify the following—

$$\frac{11\frac{1}{2} + 5\frac{1}{2} - 15\frac{1}{2}}{4\frac{1}{2} + 7\frac{1}{2} + \frac{1}{2} - 10}$$

4. Reduce $\frac{1}{2}$ and $\frac{1}{3}$ to decimals. Add the decimals, and convert the result into a vulgar fraction in its lowest terms.

5. If '0648 gram is equal to 1 grain, find, correctly to two places of decimals of a grain, the value in Troy measure of 10,000 grammes.

6. At what rate of simple interest will a sum of money amount to £7,786 16s. at the end of the first year, and £8,013 12s. at the end of the second year?

7. If 25 men working 8 hours a day execute five-sevenths of a piece of work in 74 days, how long will 37 men working 10 hours a day take to execute the remainder?

8. Find the true discount on £349 11s. 8d. for 9 months at $6\frac{1}{2}$ per cent. per annum.

9. Find the amount of £325 10s. 5d. at the end of 3 years at 4 per cent. per annum compound interest.

10. The distance from Exeter to Penzance is 132 miles. An express train starting 40 minutes after a parliamentary train from Exeter reaches Penzance 13 miles in advance. If the two trains had started at the same time the express would have reached Penzance 33 miles in advance. How long does each train take to do the journey?

11. My income is derived from £10,000 stock in the $2\frac{1}{2}$ per cents., which are at 80. How much must I sell out in order that, after re-investment of the proceeds in 4 per cents. at 120, my income may be £12 10s. greater than formerly?

12. Find the square root of $11\frac{10510}{10000}$; and of '007 to four places of decimals.

ADVANCED ARITHMETIC PAPERS.

A.

1. A man buys a number of sheep for £9,259 13s. 0d.; the price in shillings of each sheep is equal to the square root of the number purchased. Find the number purchased and the price of each.

2. A, B, and C can do a piece of work in 5 days, A can do it in 12 days, B in 17 days; how long would it take C to do it?

3. The cost of 3 turkeys and 5 geese is £1 15s. 0d., and of 19 turkeys and 3 geese is £5 7s. 0d.; find the price of one of each kind.

4. A man has £7,500 in the 3 per cents.; how would his income be affected by selling at $88\frac{1}{2}$ and investing in the 4 per cents. at $103\frac{1}{2}$, allowing in both cases $\frac{1}{2}$ per cent. brokerage?

5. In a trotting match, one horse is able to trot 8 miles an hour, and gets a start of 6 miles in a distance of 30 miles; at what rate per hour must a second horse travel so as to arrive at the winning station 5 minutes before the other?

6. Three merchants entered into partnership on the 1st January, 1860, and agreed to allow their profits to accumulate for 10 years. A subscribed $\frac{1}{2}$ of the capital and £1,000 besides, B put in $\frac{1}{3}$, and C $\frac{1}{6}$ of the capital. A withdrew his capital on the 31st December, 1866, B withdrew his on the 30th June, 1868. How is a profit of £35,500 to be divided between them at the end of the 10 years. Also find the Capital.

7. Find exactly the cube root of $431,795,777\frac{1}{8}$.

8. At what rate per cent. per annum will the true discount of £1,305 amount to £180 in $3\frac{1}{2}$ years?

9. Simplify the expression $\frac{14 \cdot 732 \times 2 \cdot 96}{30 \cdot 90 - 1 \cdot 4}$

10. The dimensions of a cistern are 12, 9, and 6 feet; what must be the height of a second cistern, equal in content to the first, supposing the bottom of the second to be a square, having its side 9 feet?

11. In a factory there are 1,300 workmen placed under four superintendents A, B, C, D. For every four men under A there are five under C and for every nine under B there are ten under D, and for every two under A there are three under B; how many under each?

12. Two men travel over the same journey, one travelling progressively, the other uniformly. The former goes a mile on the first day and travels each day two miles farther than on the preceding day. How many miles a day must the second man travel so that each may finish the journey in 21 days?

B

1. A gentleman wishing to allow his son £300 annually, lets him have the yearly dividend arising from the investment of £1,803 16s. 0d. in a stock bearing 8 per cent. at 188. How much will it be necessary to invest in funds bearing 5 per cent. at 117½ so as to complete the allowance?

2. A, B, and C do a piece of work in 15, 16, and 18 days respectively. After working together for 1½ days, C withdraws, and in 3 days more undertakes by increasing his rate of working, to finish the work in 3½ days. Find the relation which C's second rate of working bears to his first.

3. A corporation votes a certain sum for town improvements; ½ of the sum + £100 is required for sewerage; ⅙ less £300 for flagging; ⅓ for lighting; ⅙ + £50 for water works. There then remains ⅓ of the grant for miscellaneous expenses; what is the amount of the vote?

4. A person sells pencils at the rate of 9 for 7½d., making 10 per cent. profit; what would be the gain or loss per cent. were he to sell 7 for 6½d.?

5. After taking 50 gallons of liquor out of a cask, ⅔ of the remainder is found to be 7 gallons. Required the cost of the liquor, supposing the price per gallon in shillings to be equal to the square root of the whole number of gallons in the cask.

6. The wainscoting of a room 25 feet long and 20 feet broad costs £21, find the height of the room, supposing the wainscoting done at 3s. 6d. per square yard.

7. The digging of a square fish pond costs £2,460 7s. 6d., and it is found that the cost in pounds per square perch is equal to the number of perches in a side of the square. Find the area of the pond.

8. What sum must I have invested in the 3½ per cents. at 91, if after investing £4,000 in the 3 per cents. at 75, and paying an income tax of 7d. in the £ on my total gross receipts, I find my net income to be £524 6s. 0d.

9. In a pigeon match A fires 5 times to B's 4; A kills 3 birds to every 4 shots fired B kills 7 birds to every 8 shots. How many birds will A have killed by the time B has missed 10 shots?

10. A person sells two hogsheads of whiskey, one altogether making 10 per cent. Of the other ⅓ is sold at a profit of 4 per cent., and the remainder at a profit of 14 per cent. Find the prime cost per gallon of the whiskey, supposing the sale of the second vessel to produce £2 0s. 6d. more than that of the first.

11. What number added to 1½ of 12½ will make ⅔ of 50½?

12. Two graziers rent a field for £40. The first, who pays £15, puts on 2 cows to 5 of the other. How long ought the latter be permitted to allow his cattle to graze, supposing the time of the former is 4 months?

C.

1. If by selling brandy at 15s. 10d. per gallon I lose 5 per cent., at what rate per gallon must I sell it to gain 10 per cent.?

2. Multiply together by the method of duodecimals, 7 feet 9 inches 8 parts, 5 feet 3 inches 10 parts, 4 feet 7 inches 6 parts, and exhibit the result in cubic feet, and the decimal of a cubic foot, true to five decimal places.

3. If a man rows 16 miles in 6 hours against a stream, the rate of which is $3\frac{1}{2}$ miles an hour, in what time would he perform the same journey back again?

4. A vessel has two apertures, A and B, by which it can be filled in 10 minutes and 12 minutes respectively; it has also two apertures, C and D, by which it can be emptied in 6 minutes and 8 minutes respectively. Supposing the vessel to be full in what time will it be emptied (a) by opening A and C? (b) by opening all four?

5. Three flockmasters own altogether 21,950 sheep; $\frac{1}{2}$ of the number owned by the first; $\frac{1}{3}$ of that owned by the second, and $\frac{1}{4}$ of that owned by the third are all equal. How many sheep had each?

6. Express $\frac{294}{803}$ of a lb. Avoirdupois in ozs., dwts., and grs. Troy.

7. A gentleman invested the same sum in two different stocks, and his income from one is £212 more than from the other. The stocks being the 3 per cents. at $87\frac{1}{2}$, and the $3\frac{1}{2}$ per cents. at $93\frac{1}{2}$, which is the better investment? And what sum has been invested in each?

8. A and B together do a piece of work in $6\frac{2}{3}$ days, B and C together in $6\frac{1}{2}$ days, and A and C together in $7\frac{1}{3}$ days; what time will each require to do the work?

9. If A sells goods to B at 5 per cent. profit, and B sells them to C at 20 per cent. profit, and C sells them to D at 25 per cent. profit; what would be A's profit per cent., supposing he sold the goods for the price D paid for them?

10. At what rate are teas at 2s. 8d., 3s., and at 3s. 9d. per pound to be mixed so as to make the mixture worth 3s. 6d. per pound? How many pounds of the 3s. 9d. tea would be in a package of a mixture containing 3 qrs. 18 lbs. of the 2s. 8d. tea? Find also how much of each would make 2 cwt. 18 lbs. of the mixture.

11. A tradesman hires an assistant for 48 days, on condition that for every day he works he will receive 2s. 3d., but for every day he idles he must pay 1s. 2d. for board; how many days has he idled supposing he receives £3 17s. 3d. at the end of the time?

12. Find the time in which £857,661 4s. 2½d. will arise from a principal of £640,000 at 5 per cent. per annum compound interest.

D

1. Find the difference between the fourth proportional to $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$, and the mean proportional between $\frac{1}{15}$ and $\frac{1}{4}$.
2. If a person owe a certain amount payable $2\frac{1}{2}$ years hence, in what time ought he to pay $\frac{2}{3}$ of the debt so that he may retain the remainder for $3\frac{1}{2}$ years?
3. Find the present value of a perpetuity of £30 per annum when money is worth $4\frac{1}{2}$ per cent.
4. 85 lbs. of tea are mixed with 25 lbs. of a superior quality which is worth 1s. per lb. more; the mixture is worth 3s. 5d. per lb.; find the value of each kind.
5. Find the length in inches, of the edge of a cubical block containing $22\frac{1}{4}$ cubic yards.
6. Multiply by the method of duodecimals 19 ft. 8 in. 3 pts. by 17 ft. 2 in. 6 pts., and the product by 12 ft. 6 in. What does the product become when expressed in cubic feet and the fraction of a cubic foot?
7. Extract the square root of 94250·842009.
8. Find the sum of a descending series of an infinite number of terms, the first term being 10 the common ratio $\frac{1}{2}$.
9. If 20 apples are worth 12 pears, 9 pears worth 4 oranges, 12 oranges worth 240 nuts, find the cost of 25 apples, 5 pears, and 10 oranges; nuts being sold at $4\frac{1}{2}$ d. per 100.
10. Given the log of 2=·30103 and the log of 3=·4771213 find logs of $\frac{1}{2}$, $\frac{1}{3}$, ·002, 216, 1·08, ·2.
11. A man owes a debt to be paid in three equal instalments at the end of 3, 9, and 12 months respectively, discount being allowed at 5 per cent., true method: £1,274 paid at present will discharge the entire debt. How much did he owe?

$$12. \text{Simplify } \frac{(588\frac{1}{2} \text{ of } \cdot 078125)^{\frac{1}{3}}}{30 \left(\cdot 048\bar{3} \div \frac{43\frac{1}{2}}{90} \right)} \times (3\frac{1}{2} + 4 \times \frac{1}{11}).$$

Express the answer decimally.

E

1. Extract the cube root of 27557290865125.
2. A room 61 feet 8 inches long and 40 feet 4 inches wide, is surrounded with a cornice $3\frac{1}{2}$ inches wide, the gilding of which cost £7 16s. 2 $\frac{1}{2}$; how much is that per square foot?
3. In Fahrenheit's thermometer the freezing and boiling points are marked respectively 32° and 212°, whereas the corresponding points in the centigrade thermometer are marked 0° and 100°, what degree centigrade corresponds to 50° Fahr.?
4. A single grain of gold can be made to cover 56 square inches; what is the thickness of the layer, a cubic foot of gold weighing 1215 lbs. Avoirdupois? Express the answer in inches, true to eleven decimal places.
5. In what time would £325 10s. 0d. amount to £368 15s. 9 $\frac{2}{3}$ d., compound interest at 4 $\frac{1}{2}$ per cent.?
6. A lb. of chocolate and a lb. of tea cost 5s. 4d., but if chocolate were to rise 50 per cent. and tea 5 per cent. they would cost 6s. 1 $\frac{1}{2}$ d. Required the prices of chocolate and tea.
7. Simplify $\left\{ \frac{\left(\frac{3}{4}\right)^2 \times \sqrt{\frac{1}{2}}}{\frac{3\frac{1}{2}}{1\frac{1}{2}}} \div \frac{1}{2} \text{ of } \frac{1}{11} \right\}^{\frac{1}{2}}$
8. If a boy receive a penny on Saturday the 1st of January, 2d. the following Saturday, 3d. the third Saturday, and so on to the last Saturday of the following December; how much will he have received within the time?
9. Convert 19 lbs. 2 oz. 18 drs. Avoirdupois into Troy weight. Express the answer in lbs., ozs., &c.
10. If 12 masons working 8 hours a day for 14 days, build a wall 126 feet long, $8\frac{1}{2}$ feet high, and 16 inches broad, what length of wall 4 ft. 6 in. high, and 1 foot broad, would 16 masons build in 12 days of 6 hours each, the latter batch working half again as quick as the former?
11. Multiply by the method of duodecimals, 16 ft. 3 in. 2 parts by 9 ft. 6 in. 3 pts., and the product by 18 ft. 4 in. Express the result in cubic feet and the fraction of a cubic foot.
12. The breadth of a rectangular field containing 2 acres 21 $\frac{1}{4}$ perches, is 80 yards; what is its length in yards?

F

1. If a person invests £8047 $\frac{7}{8}$ in the 3 per cent. at 89, what income will he have? Brokerage $\frac{1}{8}$, and other expenses $\frac{1}{8}$ per cent.

2. A person can row 8 miles an hour on still water, and he finds it just takes him twice as long to row up as to row down the river; find the rate of the stream.

3. A and B can do a piece of work in 10 days, A and C in 12 days, and B and C in 20 days; how long would each take to do it?

4. How many bricks, each 9 inches long, 4 $\frac{1}{2}$ inches broad, and 2 $\frac{1}{2}$ inches thick, will be required to build a wall 1 $\frac{1}{2}$ miles long, 8 feet high, and 2 $\frac{1}{2}$ feet thick?

5. A rectangular field, whose length is twice its breadth, contains 5 acres; find its adjacent sides in perches?

6. A purse contains £42 8s., made up of pence, shillings, half-crowns, and sovereigns. The number of half-crowns, pence, sovereigns, and shillings are as the numbers 1, 2, 3, 8; find how many of each coin are in the purse.

7. Multiply, duodecimally, 130 ft. 9 in. 3 pts. by 8 ft. 7 in. 9 pts. and the result by 8 ft. 7 in. What does the result become when represented in cubic feet and inches?

8. Extract the cube root of 729008·7 to four places of decimals.

9. A and B enter into partnership, A contributing £800 and B £1,000. At the end of six months they admit C, who contributes £600. After the lapse of 3 years they balance the books, which show a profit of £966. Find the share of each.

10. Supposing a man to have received £144 in a year, and that the sum received each month is greater than the receipts of the preceding month by £2; how much must he have received (1) in January, (2) in December?

11. Reduce 13027 in the decimal scale to the ternary scale.

12. Reduce 1728 and 1050 to their prime factors; and thence find their least common multiple.

I.

$$1. \text{ Simplify } \left(\frac{2\frac{1}{2} \div \frac{2}{3}}{1\frac{1}{10}} \right)^2 \times \sqrt{\frac{\cdot 3 \text{ of } \frac{2}{3}}{\cdot 5 \times \cdot 1} + \cdot 35}$$

2. A cistern can be filled by one cock in 40', by a second in 30', by a third in 35', and can be emptied by a fourth in 20'; in what time would the cistern be filled if the four cocks are all opened together?

3. A gentleman after paying 5d. in the £, income tax, finds he has a nett income of £518 19s. 2d.; what is his gross income?

4. Insert two mean proportionals between 3 and .000024.

5. A house is to be built in 30 days; 36 men finish $\frac{2}{3}$ of the work in 18 days, of 8 hours each; how many additional men must be put to work for 10 hours a day to finish the house within the time?

6. To find the interest on any sum at 3 per cent. the rule is: "Multiply the pounds by twice the number of days; from the product take $\frac{1}{10}$ of itself, cut off 2 figures; the result gives the answer in pence." Prove this.

7. Show that $\sqrt{2}$ lies between $\frac{1}{1}$ and $\frac{1}{2}$.

8. A metre = 39.3708 inches. The are is a square described on 10 metres; find the ratio between the are and acre.

9. What time after one o'clock do the hands make an angle of 70°?

10. What angle do the hands of a watch make at 27 minutes past two o'clock?

11. Suppose a halfpenny stamp is $\frac{2}{3}$ in. long and $\frac{1}{3}$ broad, how many would paper a room 20 ft. 4 in. long, 13 ft. 8 in. high and 12 ft. 6 in. wide?

12. Find the price of 87 French ells 5 qrs. 3 nls. of cloth at '3s. 8d. per yard.

J.

1. A rectangular cistern 9 feet long, 5 feet 4 inches wide, and 2 feet 3 inches deep, is filled with liquid which weighs 2,520 lbs. How deep must a rectangular cistern be which will hold 3,850 lbs. of the same liquid, its length being 8 feet, and its width 5 feet 6 inches?

2. Divide $\frac{1}{2}$ of $\frac{1}{11}$ by $2\frac{1}{2}$ of $1\frac{1}{2}$. How many square yards are there in the fraction of an acre which the result represents?

3. Find, as a fraction in its lowest terms, the difference between $\frac{1}{1000}$ and $\frac{1}{175}$, and then express that difference by a recurring decimal.

4. Find the value of .00625 of a sovereign.

5. What is the principal sum to be placed at simple interest at the rate of $4\frac{1}{2}$ per cent. per annum that in 16 months it may amount to £39 12s. 6d.?

6. The purchaser of half an acre of land at 15s. 9d. per square yard, builds a house upon it and lays out the ground at a further cost of £2,094 6s. What rent per annum must he obtain so as to realize 9 per cent. on his whole outlay?

7. If 20 English navvies, each earning 3s. 6d. a day, can do the same piece of work in 15 days that it takes 28 foreign workmen, each earning 3 francs a day, to complete in 20 days; taking the value of the franc at 10d., determine which class of workmen it is most profitable to employ. If a piece of work done by navvies cost £3,000, what would be the cost of the same work done by foreign workmen?

$$\begin{array}{r} 97 \quad 291 \\ 8. \text{ Reduce } \frac{194}{485} + \frac{291}{388} \\ \hline 485 \quad 291 \\ 582 \quad 388 \end{array}$$

Divide £2.4 by .00625; and without using the common rule for the extraction of the square root, prove that 1.83 is the square root of 3.361.

9. What is meant by the "course of Exchange" between two countries? A merchant in New York wishes to remit to London 5,110 dollars, a dollar being equal to 4s. 6d. English, for what sum in English money must he draw his bill when bills on London are at a premium of $9\frac{1}{2}$ per cent?

10. A man purchases £700 Stock in the Three per Cent. Consols at $94\frac{1}{2}$, and also invests £585 in the purchase of Russian Five per Cent. Stock at $97\frac{1}{2}$. How much Stock has he standing in his name? If he sells out of the Three per Cents. at 95, and out of the Five per Cents. at $96\frac{1}{2}$, does he gain or lose by the transaction, and how much?

11. Divide 91.863 by 87.56.

12. Extract the cube root of 333894 $\frac{1}{11}$.

K.

1. Twelve men in three groups of 4 each can do a piece of work in 12 days. The work done by the several groups in the same time is as 6 : 7 : 8. When half the work is finished one man of the first group, two of the second, and three of the third quit, leaving the work to be completed by the remainder. What extra time will be required?

2. Find the value of $\frac{4 + (\frac{1}{2} \div \frac{3}{4})}{2 - 2(-\frac{1}{2})} \div (\frac{1}{2} \text{ of } 5.5 - \frac{745}{2 \div \frac{1}{2}})$

3. Two merchants enter into partnership. A brings £1,500 more than B, who, as acting partner, is to have £150 a year for the management. At the end of three years the gross profits, computed at 15 per cent. per annum, are found to be £2,925, from which B's salary is to be deducted. It is required to find the stock of each partner and his share of the net profit.

4. The income-tax of a certain person at 4d. in the pound equals the current rate of interest. £2,000 invested at this rate brings an interest of £195 in three years. Calculate the person's income.

5. If 10 yards of cloth are equal in value to 17 yards of linen of equal width, and if £50 be gained on the sale of 6,000 yards of linen, $\frac{1}{4}$ yards wide, how much profit may be realised by the sale of 5,400 yards of cloth $1\frac{1}{4}$ yards wide, profits having in the meantime increased in the ratio of 51 : 56?

6. The sum of two numbers is 342 and one is to the other as $2^6 : 5^3$. Required the numbers.

7. What sum invested at 4 per cent. per annum compound interest would be equal in 15 years to an annuity of £89 18s. 9½d. forborne for the same time at the same rate?

8. Extract the square root of $(4 + \sqrt{4 \cdot 1 + 1 \cdot 8})$.

9. A's stock in a partnership is $\frac{2}{3}$ of B's, and for every pound put in by B, C puts in two pounds. How is a profit of £600 to be divided amongst the partners?

10. A's stock is twice that of B, and is kept in trade for two thirds of the time the partnership lasts. B remains in the firm four-fifths of the time. C, who continues the whole time, contributes half as much as A and B together. How is a profit of £545 to be divided amongst them?

11. The successful candidate at an election polled three-fifths of the voters and had a majority of 756 over his rival, $\frac{1}{5}$ of the constituency remaining unpolled. Required the number that voted for each candidate and the gross number of electors.

12. Bought a quantity of wheat for which I give a bill of £506 13s. 4d. payable in four months, and immediately after sold one half for a bill of £262 12s., payable in three months, and the other half for a bill of £275 8s., payable in six months. Required the gain on each half, and the gain percent, on the whole, discount being allowed at the rate of 4 per cent. per annum.

J.

HIGHER ARITHMETIC AND MENSURATION.

EXERCISE, AND ALSO INSPECTORS OF NATIONAL SCHOOLS.

1. An estate is divided among three persons, A, B, C, so that A has $\frac{1}{4}$ of the whole, and B has twice as much as C. It is found that B has 27 acres more than C. How large is the estate?
2. 2 cwt. 1 qr. 3 lbs. of an article is bought for 15s., and 17 lbs. is sold for 1s. 8d.; what profit is made per cent.?
3. What fraction of 300 yards is 1 furlong, 2 perches, 6 yards, and 2 feet? Express the answer as a decimal.
4. Express as a fraction of an acre, the ground taken up by a path 3 feet broad round a house, the front of which is 67 feet, and side 37 feet long.
5. Extract the square root of $30789\frac{1}{4}$, and the cube root of $2326203\frac{1}{8}$.
6. How many ounces of silver are there in a piece of plate costing £59 10s., the price of silver being 255 of £1 per ounce, and the cost of the manufacture $\frac{1}{4}$ the value of the silver used?
7. Explain what is meant by the least common multiple of two or more numbers. Find the least common multiple of 3696, 286, 19656.
8. Find the value of $1\cdot7\bar{2}$ of $\cdot2\bar{7}$ of 15.
9. How much must a man invest in $8\frac{1}{2}$ per cents. at 91, in order to receive £590 per annum, after paying 4d. in the pound income tax?
10. The difference between the discount and interest on a debt due a year and a quarter hence, at 4 per cent., is 5s. What is the debt?
11. A tradesman's prices are 12 per cent. above cost price. If he allows £1 6s. 8d. discount on a bill of £21. What profit does he make per cent.?
12. A man rents a house, from the 1st of January, at £149 per annum, payable half-yearly. He sublets it for £160 per annum, payable quarterly, allowing simple interest at 4 per cent. What will he make by the transaction in 3 years?
13. A cistern, containing 600 gallons, measures externally 7 feet in length, 2 feet 11 inches in breadth, and 5 feet 6 inches in height, the sides being $1\frac{1}{2}$ inches thick; what is the thickness of the bottom? (A cubic foot of water contains $6\frac{1}{4}$ gallons.)
14. The map of a country is drawn on the scale of $\frac{1}{10}$ of an inch to a mile, what area on the map will represent a lake 4,000 acres in extent?
15. A fast train leaves a place A for another place B at the same time that a slow train leaves B for A. The fast train takes two hours on the journey, and if the slow train kept its time, they would meet at a distance from B equal to $\frac{1}{4}$ the whole distance from A to B. Instead of this, the place where they met is at a distance from B equal to $\frac{1}{3}$ the distance from A to B. How much behind time will the slow train be when it arrives at A?

Answers for this and next paper at end of book.

K1.

HIGHER ARITHMETIC AND MENSURATION, 1880.

EXCISE—Time allowed, 3 hours.

1. Find exactly the square root of $8636\frac{1}{4}$, and the cube root of $\cdot 000017676$.

2. Find the value of $\cdot 65$ of $\cdot 411$ of $\frac{3\frac{1}{2}}{13}$ of $2\cdot 432$ of 13s. 6d.

3. A rectangular grass plot, the sides of which are as 2:3, costs £14 8s. for turfing, at the rate of 4d. per square yard; find the lengths of its sides.

4. Transform 30763451 into the duodenary scale.

5. A and B buy cigars at £2 1s. 8d. per hundred. A sells them at 6d. each, while B sells them in bundles of 25 for 12s. Compare their gain per cent.

6. At what time between twelve and one o'clock are the hands of a clock exactly opposite to each other?

7. A man estimates his expenses as follows:—Rent of house, one-tenth of income; expenses of living, 80 per cent. of remainder. He finds he will then save £126 per annum. What was his total income?

8. What is the true discount on £1,380 7s. 6d. due 9 months hence, at 3 per cent. per annum.

9. Which is the better investment, the $3\frac{1}{2}$ per cents. at 91, or the 4 per cents. at 112; and what is the difference per cent. between them?

10. Find the area of a triangle whose sides are 45·6 yards, 70·2 yards, and 140·4 feet.

11. Find the number of square inches in the surface of a glass shade in the shape of a cylinder with a hemispherical top, the diameter of the shade being 12 inches, and the total height to the top of the dome 2 feet.

12. Find the number of cubic feet of stone in Cleopatra's Needle, taking the form of the obelisk as the frustum or portion of a square pyramid, 61 feet high, 7 feet 8 inches square at the base, and 4 feet 6 inches square at the top, and capped at the top by a square pyramid 7 feet 6 inches high from the base to the apex.

13. The mean temperature from the 9th to the 15th January, 1877, both inclusive, was $36^{\circ}\cdot 6$, and from the 10th to the 16th it was $39^{\circ}\cdot 9$; the mean temperature on the 9th was $30^{\circ}\cdot 5$; what was it on the 16th?

14. Two pumps, discharging respectively 80 and 100 gallons per minute, are employed to drain a well. It is observed that if the smaller pump only is at work the water sinks one inch per minute, and if both are employed from the first, the well is pumped dry in two hours. Find its depth.

L.

Given at open competition for 30 clerkships in various offices held in August, 1871.

1. Find to three places of decimals the square root of '4, what number has '04 for its square root?

2. Find the cost of painting the walls of a room at 2s. 3d. per square yard, the height being 15 feet, width 16 feet, and length 18 feet.

3. Find what weight of water would fall (1) on an acre, (2) on a square mile, in a country where the rain-fall is $\frac{1}{2}$ an inch.

4. If A can do a piece of work in 6 days, B in 8 days, and C in 9 days, how many days would all three working together finish it.

5. A man travels 60 miles in 3 hours, partly by rail and partly by coach, but if he had gone all the way by rail he would have ended his journey an hour sooner, and saved two-fifths of the time he was on the coach, how far did he go by coach?

6. The population of three towns in 1861 was respectively 22,368, 43,415, and 10,632. In 1871 the two former had increased 6 per cent. and 8 per cent. respectively, and the latter decreased 10 per cent., find the average population.

7. Multiply by the method of duodecimals 15 ft. 1 in. 3 pts. by 8 ft. 7 in. 4 pts. and the product by 6 ft. 3 in., what does the answer become when expressed in cubic feet, cubic inches, and the fraction of a cubic inch?

8. By selling a horse for £42 10s. a person lost $7\frac{1}{2}$ per cent., find the gain or loss per cent. had he sold him for £48 6s.

9. Find (true to an inch) the diagonal of a square field containing four acres.

10. A person invests £1870 in a 9 per cent. Japanese loan, which was issued at 98 per cent. at $3\frac{1}{4}$ premium, how much stock will he have, and what rate of interest will the investment give?

11. The area of a rectangular field equals 87a. 1r. 26p., find the length, the breadth being 925 links.

12. Add together $\frac{1}{2}$ of $\frac{1}{3}$ of £25, $\frac{1}{4}$ of 5 guineas, $4\frac{3}{8}$ of £1 18s. 6d., and $4\frac{3}{10}$ of £2 15s., and reduce the result to the decimal of 30 guineas.

13. The cost price of a book is 11s. 3d. If the expense of sale be 8 per cent. upon this, and the profit 22 per cent., what would be the retail price?

14. Reduce to a decimal, accurate to 7 places:—

$$\frac{1}{1\cdot2} + \frac{1}{1\cdot2\cdot3} + \frac{1}{1\cdot2\cdot3\cdot4} + \frac{1}{1\cdot2\cdot3\cdot4\cdot5} \text{ \&c.}$$

15. If the 3 per cents. are at 95, and Government offer to receive a loan of £5,000,000, the lender to receive five millions in the 3 per cents., together with a certain sum in the $2\frac{1}{2}$ per cent. stocks, what sum in the $3\frac{1}{2}$ per cents. ought the lender to accept?

M.

Set at Recent Examination for Clerkships, 2nd Jan., 1872. Time, 3 hours.

1. Reduce £4 3s. 4d. to the decimal of $\frac{1}{1000}$ of £4 3s. 4d.
2. What decimal of a chain is 186 yds. 2 ft. $8\frac{1}{4}$ in. If 1 chain=10 chainlets=100 links=1000 linkets, express the latter in chains, chainlets, &c.
3. If the specific gravity of gold be 19.3 and of copper 8.89, find the spec. gravity of a metal containing 11 parts of gold and 1 copper.
4. A merchant sells to a retailer at 60 per cent. profit, but the latter failing, he only receives 2s. 6d. in the pound. Find the merchant's gain or loss per cent.
5. If each soldier makes, per second, 2 paces of 28 inches each, how long will a regiment be walking 35 miles.
6. Multiply duodecimally 6 ft. 1 in. 3 pts. by 8 ft. 7 in. 2 pts., and the result by 8 ft. 7 in. Express the answer in cubic feet and inches, and the fraction of a cubic inch.
7. Define "Discount." Find the true discount on £100 due one year hence at 5 per cent. If £500 be invested in the 3 per cents. at $97\frac{1}{2}$, discount $\frac{1}{2}$ per cent., find the income arising therefrom.
8. Find the cost of papering the walls of a room 13.16 feet long, 7.0015 ft. broad, and 11.41 feet high, at 11.17 shillings per square yard.
9. Find the side of a square equal in area to a rectangle, the sides of which are respectively 513 yds. 1 ft. 11 in., and 1628 yds. 11 in.
10. Find exactly the cube root of $47307\frac{1}{8}$.
11. If 12 men in 7 days of 9 hours long build a wall 19 miles long, how many men could build a similar wall in 28 days of the same length as former, if 3 of the latter can do as much in $\frac{1}{2}$ hour as 5 of the former in $\frac{1}{4}$ hour?
12. If 2a. 2r. 24p. be represented by 5.12 find the value of the unit of measurement in sq. yards, and the decimal of a sq. yard.
13. If by selling an article at 6s. 6d. I gain $\frac{1}{4}$ of my outlay, what would I have gained per cent. if I sold it for 6s. 6d?
14. The attendance in a school on Monday morning was 94, on Tuesday morning 92, on Wednesday morning the average of Monday and Tuesday mornings, on Thursday 96, on Friday the average of Monday, Tuesday and Thursday mornings, on Monday afternoon the average of Tuesday and Wednesday mornings, on Tuesday afternoon 100, on Wednesday afternoon 94, on Thursday afternoon the average of Tuesday morning and Monday afternoon, on Friday afternoon 98, find the average for the week.
15. In a pack of 50 cards one is noted. The pack is divided into five equal heaps, and then combined so that the card noted is in the middle heap. The pack is next dealt into five equal heaps and again combined so that the card is in the middle heap. If the cards are now dealt into two equal heaps, shew that the noted card is 13th in the heap containing it.

N.

1. A man has £576 6s. 8d. per annum, after paying income tax at the rate of 5d. in the pound. What is his income?
2. Find the square root of '000961, and prove the correctness of the result obtained. What is the length in inches of the side of a cubical box which contains '000027 cubic yards?
3. At what rate per cent. simple interest will $8\frac{1}{4}$ d. produce 8s. 6d. interest in $83\frac{1}{4}$ years?
4. If a person by selling sugar at $5\frac{1}{4}$ d. per lb. loses 12 per cent., at what price per cwt. must he sell it in order to gain 8 per cent.?
5. Multiply by duodecimals 9 ft. 7 in. 3 pts. by 2 ft. 7 in. 5 pts., and the product by 4 ft. 2 in. What does the product become when expressed in cubic feet, cubic inches, and a fraction of a cubic inch?
6. How many revolutions will a carriage wheel make in a mile, the diameter of the wheel being 5 feet 3 inches, and the ratio of the circumference of a circle to the diameter being as 3·1416 is to 1?
7. Find (1) in chains and links, (2) in yards and feet, the diameter of a circle which contains two acres.
8. If Division by a composite number be performed by successive division by its prime factors, state the rule for finding the complete remainder. Example: divide 1437981 by 165.
9. Find the cost of painting the four walls of a room at 8d. a square yard, the length of the room being 18 ft. $6\frac{1}{4}$ in., the breadth 16 ft. $5\frac{1}{2}$ in., and the height 12 feet.
10. If a postage stamp be an inch long and $\frac{1}{4}$ ths of an inch broad, how many stamps will be required for papering a room 18 ft. 10 in. long, 16 ft. 9 in. broad, and 9 ft. 6 in. high?
11. Find the price of 3 acres, 1 rood, 7 perches, and 88 square yards, at £161 6s. 8d. per acre.
12. Find the number of yards in the side of a square park containing 489 acres, 38 perches, and $5\frac{1}{4}$ square yards.
13. A rectangular cistern, whose length is $13\frac{1}{2}$ feet, and breadth 6 feet, contains $294\frac{1}{4}$ cubic feet of water: what is the depth of the water; and what is its weight when a cubic inch of water weighs 252·4 grains?
14. A tenant holds a farm of 350 acres, subject to a tax of 3s. 6d. per acre, and a corn rent of 100 qrs. of wheat, barley, oats, and beans respectively. Find the amount of his rent when the average prices of wheat, barley, oats and beans per quarter are 34s. 9d., 26s. 4d., 17s. 2d., and 33s. 10d. respectively.

()

INDIAN C.E. COLLEGE, COOPER'S HILL.

1. Silver weighing 8 lbs. 4 dwts. is combined with 10 oz. 6 dwts. of alloy, and in the combination and manufacture $\frac{1}{17}$ th of the whole weight is lost. What is the weight of the manufactured plate?

2. The distance between two telegraph posts is 18 miles, 1 furlong, 44 yards. How many posts will be required between them, the posts being 8 rods apart?

3. What is the remainder left when £15 10s. is divided by $71\frac{1}{2}$?

4. Prove that when a fraction in its lowest terms has a denominator divisible by 3 or 7, that fraction cannot be converted into a terminated decimal. Whenever the denominator is not divisible by either of these numbers, can the fraction be converted into a terminated decimal.

5. Express by a recurring decimal the product of

$$2 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} \text{ and } \frac{1}{2} - \frac{1}{4} + \frac{1}{8} - \frac{1}{16}.$$

6. If 100 cubic feet of coals weigh as much as 126 cubic feet of water, and a cubic inch of water weighs 252.46 grains, find the weight of a cubic foot of coals in pounds and decimal parts of a pound avoirdupois.

7. Divide 38.465 by .0007.

8. A candidate in an examination wherein he has to gain half marks at least to pass, has two papers of questions placed before him, of which the first carries half as many marks again as the second. On the first paper he gains marks which are .58 of its maximum: on the second, marks which are .48 of its maximum. Does he pass or fail?

9. An article of commerce passes successively through the hands of three dealers, each of whom in selling adds as his profit 10 per cent. of the price at which he bought. If under these circumstances goods are sold by the third dealer for £33 5s. 6d., what did the first dealer pay for them?

10. A square has the area 87 acres, 1 rood, 2 perches; find the length of its side to the nearest foot.

11. In a four-sided figure where two sides are parallel to one another, the lengths of these sides are 82 chains, 4 links, and 56 chains, 6 links, and the perpendicular distance between them is 12 chains, 10 links. What is the area of the figure in acres and decimal parts of an acre?

12. A circular plate of lead, 2 inches in thickness and 8 inches in diameter, is converted without loss of weight into spherical shot each of .05 inch radius. How many shot does it make?

13. What would be the cost of painting the four walls of a room whose length is 24 ft. 9 in., breadth 17 ft. 3 in., and height 11 ft. 6 in., at 5s. a square foot?

14. If the price in shillings of a cwt. of goods be multiplied by three and divided by seven, show that the result is the value in farthings of 1 lb. weight.

P

Time allowed—three hours.

1. Add together $\cdot 05785$ of a mile and $46\cdot 25$ yards; and reduce the result to the decimal of 7 furlongs.
2. A person invests £3,395 in the 3 per cent. Consols when the price of the stock is at $84\frac{1}{2}$;—find the income he derives therefrom, and also the rate of interest he receives for his money.
3. If the price of coal be 42s. per ton, and the value of coal to the same weight of coke be in the ratio 5 : 4,—calculate the value of 10 chaldrons of coke, if 3 chaldrons = 2 loads, and each load weighs 21 cwt.
4. A detachment of cavalry consisted of 520 men after engaging in two battles, in the first of which it lost one man in every 25, and in the second $\frac{1}{4}$ of the remainder. Of how many men did the troop originally consist?
5. From two places, which are 154 miles apart, two persons set out to meet each other, one walking at the rate of 3 miles in two hours, the other five miles in 4 hours. When will they meet?
6. Find by duodecimals the cubical content of a tank 36 ft. 8 in. long, 7 ft. 11 in. broad, and 6 ft. 5 in. high; and express the result in cubic yards, feet, and inches.
7. Distinguish between interest and discount. Find the difference between the interest and discount on £908 5s. 9d., for 3 years, at $4\frac{1}{2}$ per cent.
8. Find the square root of $\cdot 00694$. Of what number is $\cdot 2$ the square root?
9. Find the cube root of 11 to 4 places of decimals.
10. Two circular gold plates, each one inch thick, of which the diameters are respectively 6 and 8 inches, are melted into one plate an inch thick. Find its diameter, having given that the area of a circle is proportional to the square of its diameter.
11. The height of a solid six inch cube is diminished by pressure to $5\frac{1}{2}$ inches; supposing the lateral expansion to be uniform throughout the mass, find accurately, to 3 places of decimals, the length of one of the edges of the new case of the solid, whose volume is supposed to remain unaltered.
12. Find the exact time between 7 and 8 o'clock when the hands of a watch coincide.
13. A rectangular grass plot, the length of whose sides are in the ratio of 5 : 6, cost £16 11s. 6 $\frac{1}{2}$ d. for turfing, at 5d. per square yard. Find the length of its sides.
14. What principal put out to compound interest for 3 years at 5 per cent. would amount to £144 14s. 0 $\frac{1}{2}$ d.?
15. If 60 cubic inches of lead, together with 54 cubic inches of cork, are equal in weight to 1,538 $\frac{1}{2}$ cubic inches of fir, and the weights of equal quantities of lead and fir are represented by the numbers 11·324 and $\cdot 45$;—what number represents the weight of an equal quantity of cork?

Q

1. Give a rule for shortening the operation of extracting the square root; and find the square root of 17 to 8 places of decimals.

2. Find the cube root of 76440958784.

3. Multiply by duodecimals 7 ft. 8 in. 7 pts., by 3 ft. 7 in. 11 pts. What does the product become when expressed in square inches, and a fraction of a square inch?

4. A person invests £4,278 in railway shares at 115, the annual dividend on each share being £5. He afterwards sells out at 125, and invests in the 3 per cent. consols at 93; find the change in his income.

5. A reservoir whose length is $40\frac{1}{2}$ feet, and breadth 12 feet, contains 1,471 cubic feet, 432 cubic inches of water; what is the depth of the water in feet; and what is its weight in tons, cwts., &c., when a cubic inch of water weighs 252 grains?

6. If division by a composite number be performed by successive division by its prime factors, state the rule for finding the complete remainder. Example: Divide 2875962 by 165.

7. Find the value of $\frac{\frac{3}{5} + \frac{3}{5}}{\frac{1}{1} + \frac{1}{4}} \div \frac{\frac{7}{8} + \frac{3}{8}}{\frac{1}{8} + \frac{3}{8}}$ of 13 tons, 7 cwts.

3 qrs. 12 lbs., and reduce the result to the decimal of 1 ton.

8. If 24 men in 6 days of 8 hours long can dig a trench 140 yards long, 4 yards wide, and 2 yards deep, in how many days of 9 hours will 90 men dig a trench 6 yards wide, 4 yards deep, and 490 yards long?

9. A person, by selling an article which cost £14 per cwt. at 2s. 9½d. per lb., makes 5 per cent. more profit than he would do if he sold the whole for £55. 15s. 8½d. What was the amount sold?

10. Reduce $\frac{123333}{1111}$ of 22½ of 59 of 234 to a vulgar fraction in its lowest terms.

11. Ten men working $10\frac{1}{2}$ hours a day can finish a piece of work in 9 days; if, however, 3 of them can only work 6 hours a day, find how many hours a day the other 7 must work to finish in 10 days.

12. If the discount on £930 7s. 6d., at 3½ per cent. be £3 7s. 6d., when is the money due?

13. A person can discharge a debt by paying at the end of one, two, and three years, equal instalments of £1,771. What is the amount of the debt, interest being reckoned at 5 per cent?

14. If 0.359375 of a ton cost £15.203125, how much can be bought for 1.35416 of 1 guinea?

R

CLASS II.—MAY, 1875.

1. Multiply 4,327 by 814, and explain the method. Multiply 32,856, by 121,711 in three lines of Multiplication only.

2. Define G. C. M., and find the G. C. M. and L. C. M. of 157 days, 7 hours, 4 minutes, 7 seconds, and 243 days, 2 hours, 11 minutes, 49 seconds.

$$3. \quad 1\frac{1}{2} \text{ of } \frac{\frac{1}{2} + 1\frac{1}{2} + \frac{1}{2}}{2\frac{1}{2} - 3\frac{1}{2} + 4\frac{1}{2}} \times \frac{\frac{2\frac{1}{2}}{3\frac{1}{2}} + \frac{1\frac{1}{2}}{1\frac{1}{2}}}{\frac{8}{4\frac{1}{2}} + \frac{4\frac{1}{2}}{3}}$$

4. Gold is worth £3 17s. 10½d. per ounce, and silver 5s. 2½d. per ounce; how many sovereigns weigh as much as 5000 shillings?

5. A person shooting at a target distant 550 yards, hears the bullet strike the target four seconds after he fires. A spectator, equally distant from the target and the shooter, hears the shot strike the target two and a half seconds after he heard the report. Find the velocity of sound.

6. Divide 8.06 by .1809523.

7. What is the number of yards in the side of a square field containing 3,952 acres, 3 roods, 18 peckes, 21½ square yards?

8. Multiply by duodecimals 9 feet, 7 inches, 3 parts, by 2 feet, 7 inches, 5 parts, and the result by 5' 7", and what does the product become when expressed in cubic feet, cubic inches, and a fraction of a cubic inch?

9. Find, in feet, the length of the edge of a cube containing 41,063 cubic feet, 1,080 cubic inches.

10. A person buys five shares in a concern at 40, next year the price is 45, and every succeeding year there is a fall of 4. Each year he sells out one share, and finds, at the end, he has neither gained nor lost. What interest did the concern pay?

11. A person sells an article at 5 per cent. profit. If he had bought it at 5 per cent. less and sold it for 1s. less, he would have gained 10 per cent. What was the cost price.

12. A person has £5,000 stock in the 3 per cents., which he invests in the 3½ per cents. at 87½, thus increasing his income by £5. Find the price of the three per cents.

13. On a piece of work 2 men and 5 boys are employed, who do half of it in six days. After this, 1 man and 1 boy more are put on, and ½ more is done in three days. How many more men must be put on that the whole may be completed in one day more?

14. In a mile race, A starts 270 paces of 48 inches per minute, B at 300 paces of 44 inches per minute. After 4 minutes B quickens his pace to 320. Which wins, by how much, and in what time?

15. If the weight of one cubic foot of water is 62.35 pounds avoirdupois, find the error in calculating the weight of 1,000 cubic feet on the approximate assumption that one cubic foot weighs 1,000 oz.

S

CLASS II.

1. Define the least common multiple of two or more numbers. Find the least common multiple of 26520 and 27182, and explain the process; and add together $4\frac{2}{3}$ and $2\frac{1}{3}$.
2. Find the square root of $99\frac{3}{4}$, and '07 to five places of decimals.
3. A legacy remains unclaimed for four years. At the end of that time it amounts to £14,586 ls. 6d. at 5 per cent. compound interest. What was the original bequest?
4. What do you mean by discount? Find the true discount on £5,387 15s. 6d. due four years hence at $5\frac{1}{2}$ per cent. per annum.
5. Multiply by duodecimals 6 ft. 3 in. 8 pts. by 7 ft. 4 in. 8 pts., and the result by 8 ft. 5 in. Express the result in cubic feet, cubic inches, and fractions of a cubic inch.
6. What would a pound be worth at Paris if a bill at Amsterdam of 12 florins 15 cents sells for £1, and 9 florins 50 cents are worth 20 francs at Paris?
7. Find the length of the edge of a cubical reservoir whose contents are 120,066 cubic yards 10 cubic feet.
8. Find the vulgar fraction equivalent to the circulating decimal .03249; and, supposing it to be the fraction of a pound, express its value in pence and the fraction of a penny.
9. A person invests £9,075 in the 3 per Cents. at 90 $\frac{1}{2}$, and when they have risen to 91 he sells out and invests in the 3 $\frac{1}{2}$ per Cents. at 97 $\frac{1}{2}$. Find the alteration in his income.
10. A prisoner of war in attempting to escape to a friendly ship, moored within sight of land, swims out at the rate of three miles per hour, and is assisted by the tide, which ebbs at the rate of 200 yards per hour. After swimming for three-quarters of an hour the tide turns and impedes him as much as it had previously assisted him. He also slackens his speed from 3 to 2 $\frac{1}{2}$ miles per hour, and succeeds in reaching the vessel in another hour. How far was the vessel from the shore?
11. By selling tea at 2s. 8d. per pound, a merchant gains $\frac{1}{5}$ of his outlay. He then raises the price to 8s. 1d. per pound. What does he clear per cent. on the original outlay?
12. A shilling weighs 8 dwts. 15 grains, of which three parts out of every forty are alloy, and the rest pure silver. If the value of silver rises 8 per cent., what must be the reduction of pure silver in a shilling?
13. The population of a town at the census of 1861 was 55,665; at the census of 1871 it was found to be 63,422. The number of deaths during the 10 years was 17·7 per cent. on the population at first census. What must have been the number of births in the period?
14. Mercury expands under heat at the rate of $\frac{1}{1000}$ of its volume for every degree (Fahrenheit) of temperature. Find the weight of a column of mercury 6 inches in height and $\frac{1}{4}$ of a square inch in section, at a temperature of 70°; assuming the weight of a cubic foot of water at 60° to be 1,000 avoirdupois, and the weight of mercury at the same temperature to be 13·6 that of water.
15. By means of the following table of the present value of an annuity of £1 for different periods, find the present value of £200 payable for 20 years, to commence 10 years hence. What would be the value if the payment were to commence 20 years hence?

Years.	Value.
10 	8·110896
20 	15·690826
30 	17·292033
40 	19·792774

ASSISTANTS OF EXCISE—"ADVANCED ARITHMETIC & MENSURATION,"
(Set at this Examination for first time.)

1. At what rate per cent., simple interest, will £900 amount to £1,120 10s., in 7 years?

2. There are in a manufactory a certain number of workmen who receive 50s. a week; twice as many who receive 31s. 6d. a week; and eleven times as many who receive 14s. a week; the total amount paid for the workmen's wages is £93 9s.; find the number of workmen.

3. If a coach travels at the rate of $8\frac{1}{2}$ miles per hour, and a railway train runs 25 miles while the coach is going 8 miles, how much time will a traveller save in a journey of 152 miles by adopting the train as his mode of travelling?

4. If 200 men can make an embankment 5 miles long in 25 days, how much overtime must 60 men work in order to finish an embankment 2 miles long in 32 days; 12 hours being taken as a day's work?

5. Extract the cube root of 1194389981; and the square root of $15475\frac{1}{4}$.

6. A room, three times as long as it is broad, is carpeted at 4s. 6d. a square yard, and the walls are coloured at 9d. per square yard, the respective cost being £8 5s. 4d. and four guineas. Find the dimensions of the room.

7. Divide .37 by 1.17; multiply the result by the quotient of .052 divided by 1.8, and give the answer in the form of a vulgar fraction.

8. Divide £857 5s. 8d. among four persons, A, B, C, and D, so that A may have twice as much as B, B three times as much as C, and C four times as much as D.

9. Find the present worth of £2674 6s., due 3 years hence, at $4\frac{1}{2}$ per cent.

10. By disposing of goods for £9 10s., a man loses 5 per cent.; what would he gain or lose if he sold them for £11 17s. 6d.?

11. Find, by duodecimals, the solid content of a room 14 ft. 7 in. long, 12 ft. 5 in. wide, and 11 ft. 8 in. high; express the result in cubic feet and fraction of a cubic foot.

12. The sides of a quadrilateral field, A, B, C, D, are as follows: A B 200 links; B C 650 links; C D 905 links; A D 570 links; and the diagonal A C = 800 links. Find the area of the field.

13. Find, within an inch, the diameter of a circle whose area is 100 square yards.

14. A rectangular block of granite is 10 ft. 6 in. in length, 8 ft. 3 in. in width, and 4 feet deep; find the length of the edge of a cube (to two places of decimals) which has the same solid content.

15. A builder contracted to build a house in 12 weeks, and agreed to pay £5 for each day, or part of a day, that the work remained incomplete after the end of that period. To fulfil his contract he engaged 15 men to work 10 hours a day; at the end of three weeks ten of the men struck and remained away from their work for a fortnight. After their return the number of working hours was reduced to 9. What was due from the contractor?

U

HIGHER ARITHMETIC AND MENSURATION.

(EXCISE CANDIDATES.)

1. How do you determine whether a vulgar fraction will produce a terminating decimal? Find the vulgar fraction which is equal to $\frac{4949}{842552}$

$3 \cdot 42552$

2. Extract the square root of $\cdot 00005476$ and the cube root of $2\frac{3}{4}$.

3. In what time will \$2,151 6s. 8d. amount to \$2,866 9s. 4d., at $2\frac{1}{4}$ per cent. simple interest?

4. Find the compound interest on £2,080 for 3 years, at 4 per cent. per annum (neglecting fractions of a penny).

5. Find the present worth of £2,467 12s. due 9 months hence, the rate of simple interest being $3\frac{1}{2}$ per cent.

6. A train starts with its full complement of passengers. At the first station it drops one third of these and takes in 96 more. At the next it drops one half of the new total, and takes in 12 more. On reaching the third station there are found to be 248 left. What number started?

7. Find by duodecimals the volume of water which will fill a tank of which the interior is 5 feet long, 4 feet 7 inches wide, and 2 feet $4\frac{1}{2}$ inches deep. Express the answer in cubic feet and the fraction of a cubic foot.

8. If a man, his wife, and child consume 36 pounds of bread in 9 days, when bread is at 5d. the four pound loaf, how much bread a day would a family, consisting of a man and wife and three children, have to restrict each member to so as not to exceed the same rate of expenditure when the four pound loaf costs 6d.? In each case assume that the rate of consumption of a man, woman, and child are as 4, 3, and 2.

9. It appeared from a daily paper, that the annual expenses of the Suez Canal might be estimated at about 17,800,000 francs, exclusive of 10,000,000 of francs needed for the payment of the interest on the shares. Assuming that all the receipts over and above the sum of these amounts are to be divided as profits among the shareholders, the founders, and the Egyptian Government, the holder of shares taking 70 per cent., and each of the latter parties 15 per cent., what must the yearly receipts be in order that an English holder of 20 shares out of the 400,000 representing the whole stock, may receive £73 10s. as his proportion of the profits? (£1 = 25 francs.)

10. The specific gravities or relative weight of proof-spirit and water may be taken as 923 and 1,000, disregarding temperature. From a gallon jar filled with proof-spirit a certain quantity is drawn off and water added till the vessel is again full. The mixture is then found to have a specific gravity of 992. How much spirit has been abstracted?

11. In what proportions must wines of 15s., 20s., 26s., and 30s. a gallon respectively, be mixed, so as to give a profit of $14\frac{1}{2}$ per cent. on the cost when sold for 24s. a gallon?

12. A person invests £5,617 10s. in the three per cents. at 92 $\frac{1}{2}$. He sells out when they have fallen to 91 $\frac{1}{2}$, and invests the proceeds in Russian five per cents. at 98. What is the difference in his income under the two investments? Brokerage is to be reckoned at $\frac{1}{4}$ per cent. on all the stock sold or bought.

13. The sides of a triangular field are 58, 50, and 40 chains: find its area.

14. Find the area of the largest circular plate that can be cut out of a square sheet of iron containing 25,281 inches.

15. The base of a rectangular prism is an equilateral triangle with a side of 7 inches, and its height is 24 inches: find its cubic contents. ($\sqrt{3}=1.732$.)

V

HIGHER ARITHMETIC AND MENSURATION.

EXCISE, AND ALSO INSPECTORS OF NATIONAL SCHOOLS.

(3 hours).

1. (a) What is a recurring decimal? (b) Illustrate your definition by writing in full the fraction which in the ordinary notation is written 1.1081 , and (c) find its equivalent vulgar fraction.
2. What ready money will discharge a debt of £2,113 16s., due 4 months hence, at $\frac{4}{5}$ per cent per annum, simple interest?
3. The annual consumption of brandy in a country is 4,500,000 gallons, and the duty is 9s. 2d. per gallon. The duty is reduced 6 per cent., and the consumption then increases 8 per cent. How is the revenue affected?
4. A cask weighing 2 cwt. 12 lbs. 4 oz. floats in a cubical cistern of water, whose side is 5 feet. On the removal of the cask find how much the water will sink in the cistern, supposing a cubic foot of water to weigh 63 lbs.
5. The proprietor of a boarding school having already 80 pupils, finds that an addition of 5 increases his gross yearly expenditure by £300, but diminishes the average cost per head by £1. What did his annual expenses originally amount to?
6. Each page of a book of 560 pages contains 40 lines, and each line contains on an average 41 letters. How many pages will there be in another edition of the book consisting of pages of 60 lines, each line one quarter longer, and printed in type occupying more space on the line in the proportion of 6 to 5 than that used in the smaller edition.
7. (a) What is meant by saying that "London and North Western Stock is at 127 $\frac{1}{2}$?" (b) I invest £3,103 in a Company when the shares are $\frac{5}{4}$ above par, and when they are at £93 I sell out and reinvest my capital in a Company whose shares are $\frac{4}{5}$ below par; when these last shares are 1 above par I sell out. What money have I gained or lost? Neglect fractions of a penny.
8. In what proportion must a grocer mix black tea at 2s. 4d. the lb. with green tea at 3s. 8d., so as to sell the mixture at 2s. 8d. the lb?
9. Multiply by duodecimals 5 feet 6 inches by 3 feet 4 inches, and the product by 2 feet 3 inches. Give the result in cubic feet and inches.
10. In Fahrenheit's thermometer the freezing point is 32° , and the boiling 212° ; in Reaumur's and the Centigrade thermometers the freezing point is 0, and the boiling point 80° and 100° respectively. When the Centigrade stands at 5 degrees below zero, where will (a) the Fahrenheit and (b) Reaumur stand?
11. One kilogramme = 10 hectogrammes = 100 decagrammes = 1,000 grammes. Find the value of 47 kilogrammes, 8 decagrammes, 4 grammes of an article, the price of which is £23.57 per kilogramme. Give the answer in £ s. d.
12. Two clocks strike 9 together on Monday morning. On Tuesday morning one wants 8 minutes to 11 when the other strikes 11. How much must the slower be put on that they may strike 9 together in the evening?
13. Vessel A contains 24 gallons of water; vessel B contains 12 gallons of wine. One gallon is taken out of each, and is then poured into the other. This is done three times. How much wine and how much water will the vessels then respectively contain?
14. What is the area of the largest circle that can be inscribed in the square whose area is 5,499,025 square feet? Give also the length of its circumference.
15. Write down the volume of a circular cone in terms of the height and the area of its base.
What is the volume of the largest cone that can be cut out of the cube whose volume is equal to that of the rectangular solid whose edges are respectively 365, 1012, and 2783 feet?

W

HIGHER ARITHMETIC AND MENSURATION

EXCISE, DECEMBER, 1877.

(Time allowed, 3 hours).

1. Find, exactly, the square root of $8636\frac{1}{4}$, and the cube root of 000017576 .

2. Find the value of $\frac{1}{65}$ of $4\frac{1}{11}$ of $\frac{3\frac{1}{2}}{13}$ of $2\frac{1}{2}$ of $13s. 6d.$

3. Multiply (by duodecimals) 13 feet, 6 inches, 7 pts., by 8 feet, 3 inches, 3 pts., and the product by 4 feet 5 inches. What does the product become when expressed in cubic feet, cubic inches, and the fraction of a cubic inch?

4. A rectangular grass plot, the sides of which are as 2 : 3, costs £14 8s. 0d. for turfing, at the rate of 4d. per square yard; find the length of its sides.

5. Transform 30763451 into the duodenary scale.

6. A and B buy cigars at £2 1s. 8d. per hundred. A sells them at sixpence each, while B sells them in bundles of 25 for 12s. Compare their gain per cent.

7. At what time between 12 and 1 o'clock are the hands of a clock exactly opposite to each other?

8. A man estimates his expenses as follows: Rent of house, one-tenth of income; expenses of living, 80 per cent. of remainder. He finds he will then save £126 per annum; what was his total income?

9. What is the true discount on £1380 7s. 6d., due nine months hence, at three per cent. per annum?

10. Which is the better investment, the $3\frac{1}{2}$ per cents. at 91, or the 4 per cents. at 112; and what is the difference per cent. between them?

11. Find the area of a triangle whose sides are 45·6 yards, 70·2 yards, and 140·4 feet.

12. Find the number of square inches in the surface of a glass shade in the shape of a cylinder, with a hemispherical top, the diameter of the shade being 12 inches, and the total height to the top of the dome 2 feet.

13. Find the number of cubic feet of stone in Cleopatra's needle, taking the form of the obelisk as the frustum or portion of a square pyramid, 61 feet high, 7 feet 8 inches square at the base, and 4 feet 6 inches square at the top, and capped at the top by a square pyramid 7 feet 6 inches from the base to the apex.

14. The mean temperature from the 9th to the 15th January, 1877, both included, was $36^{\circ}\cdot6$, and from the 10th to the 16th it was $39^{\circ}\cdot9$; the mean temperature on the 9th was $30^{\circ}\cdot5$; what was it on the 16th?

15. Two pumps, discharging respectively 80 and 100 gallons per minute, are employed to drain a well. It is observed that if the smaller pump only is at work, the water sinks one inch per minute; and if both are employed from the first, the well is pumped dry in two hours. Find its depth.

X

HIGHER ARITHMETIC AND MENSURATION.

EXCISE, JUNE 1878.

(Time allowed, 3 hours).

1. Find the square root of 144·600625, and the cube root of $3460\frac{41}{125}$.
2. Reduce $\frac{45}{16}$ of 2·16 of 2s. 6d. to the fraction of $\frac{1}{16}$ of 1·18 of \$5.
3. Multiply 79 feet $7\frac{1}{2}$ inches by $69\frac{1}{2}$ inches; and express the result in square rods and a fraction of a rod.
4. The dimensions of a rectangular box are as 2 : 3 : 4; and the difference between the cost of covering it with sheet lead at 8d. and 8½d. per square foot is 4s. 10½d. What are the dimensions of the box?
5. Reduce to the decimal of a cubic yard the volume which is expressed in the duodenary scale by 1538 cubic inches.
6. A merchant buys wine at \$47 5s. per hogshead, and offers it for sale at 40s. per dozen bottles. If he allows 5 per cent. discount for cash payment, what profit per cent. will he still make on his outlay?
7. Two men run a three-mile race round a course of $\frac{3}{4}$ mile. If their rates are as 4 : 3, how often and where does the winner pass the other?
8. Of the inhabitants of a district devastated by war 60 per cent. were slain, $\frac{2}{3}$ of the remainder perished in flight, and 200 alone survive. What was the population of the district?
9. Find the value, on March 1st, of the expectation of a sum of \$3,724 10s. 5d., due November 30th the same year, the rate of interest being 5 per cent. per annum.
10. What income will be obtained by investing \$2,849 in 3 per cent. stock at 92½? What sum invested would produce the same income when the price of the stock is 91?
11. Find the area of a quadrilateral figure in which one of the diagonals is 93 feet, and the perpendiculars upon it from the opposite angles are 60·5 feet and 36·7 feet respectively?
12. What quantity of metal will be required to make a hollow spherical ball, the external diameter being 18 inches, and the thickness $\frac{1}{4}$ inches?
13. Find the area of the surface of a frustum of a cone, the diameters of the ends being 2 feet 6 inches, and 1 foot 3 inches, and the height 5 feet.
14. In Fahrenheit's thermometer the freezing point is marked 32°, and the boiling point 212°, and in the Centigrade thermometer the freezing point is 0°, and the boiling point 100°. When the temperature, according to Fahrenheit, is 65°, what is it by the Centigrade?
15. The pressure of compressed air varies inversely as its volume. If the pressure on the inner surface of a cylinder, fitted with a piston, be 20 lbs. on the square inch, and when the piston is forced in 2 inches the pressure becomes 30 lbs. on the square inch, what is the length of the cylinder?

* For remarks on this vaguely set question, see Author's Key.

Y

CLERKSHIPS—CLASS II.—JUNE, 1878.

(Time allowed, 3 hours).

1. What decimal is equivalent to

$$8.571428 + 2.3030^* - 7.318 - .3?$$

Give the answer to six places of decimals?

- 2 Find the square of the number whose cube is 469097433.

3. Simplify

$$(i.) \frac{1}{4} \text{ of a ton} + \frac{1}{2} \text{ of 2 cwt.} + \frac{1}{4} \text{ of a gr.} + 96 \text{ lbs.} - [3\frac{1}{2} \text{ of a cwt.} \times 2\frac{1}{2}].$$

$$(ii.) \frac{4.285714 \text{ of } 3.4}{1\frac{1}{2} \text{ of } 2.428571} \times \frac{.43 \text{ of } .625}{.24}$$

4. Three debts of £200, £300, £400 are due respectively in 3, 4, 5 months. If the interest is 5 per cent. per annum, what amount will pay them off at the end of 4 months?

5. A man's income is £1,723 6s. 8d. He exchanges it in Paris from English to French money. When French money is at par, 1 franc = 9.4d.; but at the time of his exchange it is at a discount, being worth 2.2 per cent. less than when it is at par. How much did he get?

6. If an iron-clad ship ordinarily cost £80,000 building,
- $\frac{2}{3}$
- as much equipping,
- $\frac{1}{3}$
- as much storing; and the cost of 12 such vessels, supposing that 5 per cent. is saved on the cost of the building,
- $17\frac{1}{2}$
- per cent. on fitting, and 15 per cent. on storing.

7. A person invests £2,645 in railway shares at 115, the annual dividend on each share being £5. He afterwards sells out at 125, and invests in 3 per cent. consols at 93
- $\frac{1}{2}$
- . Find the change in his income.

8. A steam engine of
- $4\frac{1}{2}$
- horse power, working 51 days at 6 hours a day, consumes 25 tons of coal. How much coal will be consumed by a 17 horse power engine, working at the same work for 3 days at
- $8\frac{1}{2}$
- hours a day?

9. What sum will £668 6s. 8d. amount to at compound interest in 5 years at 11 per cent., neglecting fractions of 1d.?

10. Two cogged wheels work together, there being 32 cogs on one and 36 on the other. The larger wheel makes 64 revolutions per second. How often will the same cogs come in contact during 6 working days of 10 hours each?

11. A and B run a mile race. A goes 5 feet at each step, and takes 3.3 steps per second all through the race. B goes 6 feet at each step, and takes 3 steps per second for
- $\frac{1}{2}$
- mile; but in the last
- $\frac{1}{2}$
- mile he only goes 5.5 feet at each step, and takes 2.5 per second. Which won the race; and what time did each take?

12. A plank 9 inches wide, 2 inches thick, and 8 feet long, weighs 1 oz. to the cubic inch; find the length and thickness of another plank of the same material, width, and solid content, if 2 inches cut off the end weighs 57 oz.

13. A, B, and C can do a piece of work together in 60 days. After they have worked together for 10 days A withdraws, and B and C work together at the same rate for 20 days. B then withdraws, and C completes the work in 96 days, working
- $\frac{1}{2}$
- longer each day. Working at his former rate C could alone do the work in 222 days. Find how long A and B would each take to do it separately.

* So printed by Examiners. It ought to be .66.

1. Multiply $3\cdot285714$ by $\cdot384615$, and express the result as a circulating decimal.

2. Reduce to its lowest terms—

$$\frac{1}{102960} + \frac{121}{566280} + \frac{1}{463320}$$

3. Divide 32547631 by successive division by the prime factors of 1155 , and show how to obtain the complete remainder.

4. Find the square root of $\cdot0036372961$ and of $24508\frac{1929}{56644}$.

Give the first answer as a decimal and the second as a mixed fraction.

5. Find by duodecimals the cubic contents of a room 19 ft. 9 inches long, 14 ft. 8 inches wide, and 11 ft. 3 inches high; and the area of the four walls.

6. A, B, C, and D undertake to do a piece of work. A's rate of working is to B's as 3 to 4 ; B's is to C's as 5 to 4 ; C's is to D's as 5 to 6 . A would do it alone in 60 hours. Find in what time each of the other three would do it alone, and in what time all four would do it working together.

7. A piece of metal $5\cdot12$ inches long, $3\cdot43$ inches wide, and $1\cdot25$ inches thick is melted into a perfect cube. Find the length of the edge of the cube and the difference made in the amount of surface.

8. How much must I invest in the three per cents. at 85 in order to have an income of $\pounds 780$ per annum after paying an income tax of $6d.$ in the $\pounds$?

9. A train leaves London for Brighton at 8 a.m. and meets another, which left Brighton for London 35 minutes later, at $9\cdot30$ a.m. 30 miles from London. Compare the rates of the two trains. The distance from London to Brighton is 40 miles.

10. The population of a country increases three per cent. annually, but is decreased annually by emigration to the extent of one-half per cent. on the whole. What will be the increase per cent. in three years?

11. A tradesman commences business with a certain capital. At the end of the first year he adds a sixth to it; at the end of the second year he adds to it one-seventh of his new capital; at the end of the third year one-eighth of the capital with which he began that year; and at the end of the fourth year one-sixth of his last new capital. He then finds he has in his business $\pounds 23,737$. What did he commence with?

12. A man whose income is derived from $\pounds 40,000$ stock in consols paying three per cent. sells out at 95 , and invests half the proceeds of the sale in India four per cents. at 104 and the other half in Canadian Railways (paying four per cent.) at $105\frac{1}{2}$. Find within a penny how his income is affected.

13. A man leaves his estate to be divided among his three sons and two daughters in the following way: the eldest son is to have one-third of the property, the second son a sum equal to two-thirds of the elder's share, and the third a sum equal to four-fifths of the second's. The elder daughter's share is to be equal to two-fifths that of the second and third sons together, and the younger daughter is to have the remainder. It is found by this division that the younger daughter will receive $\pounds 50$. Find the value of the estate, and what each of the others would receive.

14. A cistern 5 ft. long and 3 ft. 6 ins. wide, filled with water, loses $\cdot0005$ of its depth of water by evaporation, and it is found that the loss by evaporation has amounted to 2 lbs. 5 ozs. weight of water. Find the depth of the cistern. (A cubic foot of water weighs $62\frac{1}{2}$ lbs.)

1. Find the value of $\cdot 416$ of $\frac{\cdot 015 \times 2 \cdot 1}{\cdot 085}$ of $\cdot 05714$ of 11s. 8d.
2. Transform 6520115 from the septenary scale (where the radix is 7) to the undenary scale (where the radix is 11).
3. Find the Least Common Multiple and the Greatest Common Measure of 27720, 396, and 5184.
4. Find the value, correct to six places of decimals, of—

$$\left(\frac{1}{30} + \frac{1}{30}\right) + \left(\frac{1}{30} + \frac{1}{30}\right)^2 + \left(\frac{1}{30} + \frac{1}{30}\right)^3 + \dots \text{&c.}$$
5. The difference between the Simple and Compound Interest on a certain sum of money for three years at 5 per cent. is £13 6s. 10½d. What is that sum of money?
6. A question in duodecimals.
7. A person, after spending £80 more than $\frac{1}{3}$ of his yearly income, had then remaining £70 more than the $\frac{1}{3}$ of it. What was his income?
8. A garrison of 2,000 men is supplied with provisions for 15 weeks at the rate of 13 ozs. per man per day. How many men must leave in order that the provisions may last those left for 26 weeks, giving each man 10 ozs. per day?
9. If 6½ thalers be equal to £1, and 98 francs equal to 25 thalers; also 5 scudi be worth 27 francs, and 185 gulden be of the same value as 62 scudi; find how many gulden must be given for £10.
10. Two rectangular rooms of the same height were papered; the former was 16 feet long and 14 feet wide, and the latter 14 feet long and 12 feet wide. The paper was 1 foot 9 inches wide, and cost 2s. 9d. per piece of 12 yards, and the hanging cost 9d. per piece. The whole expense was four guineas. Find the height of the rooms.
11. An orchard contained 192 fruit trees; some apple trees, some pear, some plum, some cherry, and the remainder walnut. For every 3 apple trees there were 2 pear trees, and for every 3 cherry trees there were 2 walnut trees; there were 2 plum trees to every 11 apple trees, and 7 cherry trees to every 2 plum trees. Find the number of each sort.
12. A nugget, weighing 3 lbs. 14 ozs. avoirdupois, was purchased at £39 4s. per lb. avoirdupois. On separating the quarts from the gold it was found that the gold was to the quarts as 21 to 4. It was afterwards sold at £3 17s. 4d. per oz. troy. Find the gain or loss.
13. Find the square root of 107444; and the cube root of 347428927.
14. A waggon leaves London for Oxford at 5.30 a.m., and travels at the rate of 6 miles per hour. A coach, whose rate is to that of the waggon as 5 is to 3, leaves London some time after, also for Oxford, overtakes the waggon at 10.30 a.m., and proceeds to its destination, where, after remaining an hour, it commences its return journey, and meets the waggon $3\frac{1}{2}$ miles from Oxford. Find the distance between London and Oxford, and the time (1) when the coach leaves London, (2) when it arrives in Oxford, (3) when it meets the waggon, and (4) when it arrives in London; also the time when the waggon arrives in Oxford.

SOLICITORS' APPRENTICES.

A.

1. A merchant buys 4 bales of cloth, each containing 6 pieces, and each piece of 27 yards, at £16 4s. per bale; what was the price of the whole, and what the rate per yard?

2. Find the value of 43·35 articles at 8s. 11½d. each.

3. What is the interest of £243 10s. for 2 years and 5 months, at 4½ per cent.?

4. Reduce 5d. to the fraction of a shilling, and 3s. 4½d. to the fraction of £1.

5. If the valuation of a parish amounts to £2514 7s. 6d., and a rate be struck of £83 16s. 3d., how much is that in the £, and how much must be paid by a farm valued at £115 12s. 6d.?

6. A Bankrupt owes A £515 12s. 6d., B £407, C £293 6s. 8d.; his estate is worth £911 19s. 4½d.; how much can he pay in the £, and what will A, B, and C, each receive?

B.

1. What is the cost of 80 cwt. 2 qrs. 14 lbs., at £1 17s. 8½d. per qr.?

2. An article which cost 3s. 6d. is sold for 3s. 10½d.; find the gain per cent.

3. What is the interest on £684 18s. 8d., for 1 year and 11 months, at 4½ per cent.?

4. A bankrupt is indebted to A £256 6s. 8d., to B £203 10s., and to C £141 13s. 4d.; his assets are £421 1s.; how much should each receive?

5. A person invests £4800 in the 4 per cent stock, at 80; and at the end of each year invests the dividend which becomes due in the same stock. If the stock remains at 80 for 3 years, find his dividend at the end of the third year.

6. There are five partners in a business which produces £2100 profit. The senior partner has six shares, the second five, and the three juniors one share each; what does each partner receive?

C.

1. What is the product of £860 19s. 7½d. $\times$ 149?
2. What is the income tax on £1849 11s. 6d., at 10d. per £?
3. What fraction of an acre is 3 roods 25 pl.?
4. What is the purchase money of 16 acres, at 18s. per perch?
5. What is the rent of 89 a. 3 r. 17 p., at £2 12s. 6d. per acre?
6. If the price of 8 cwt. 1 qr. 7 lbs. is £66 10s., what will be the price of 8 cwt. 2 qrs. 14 lbs. at the same rate?

D.

1. What is the interest on £640 10s. 6d., for $2\frac{1}{2}$ years, at $4\frac{1}{2}$ per cent?
2. What is the interest on £1960 10s., for 2 years and 45 days, at $3\frac{1}{2}$ per cent.?
3. Reduce the following to their lowest denominations: £14 7s. 5½d., and 5 days 12 hours 8 minutes.
4. What is the income tax on £1500, at 7d. in the pound?
5. Reduce to an improper fraction $21\frac{1}{2}$.
6. Calculate the rent of a farm of 25a. 8r. 11 pls., at £1 16s. 6d. per acre.

E.

1. The rent of a farm containing 56 Irish acres is £125: find the content in statute acres, and the rent per statute acre, one statute acre being equal to 2 roods 18 perches Irish.
2. Reduce 18069 perches to acres.
3. Find the product of £129 11s. 9½d. $\times$ 378.
4. What fraction of two shillings is 2½d.
5. The rent of 5 acres 1 rood 30 perches is £80; what is the rent of 21 acres 3 roods at the same rate?
6. The debts of a bankrupt amount to £9684; his assets are £4781 14s. 5½d.: how much can he pay in the £?

F.

1. What is the interest on £279 11s., for $7\frac{1}{2}$ months, at 4 per cent.?
2. What is a digit? Each digit has an absolute and a relative value. Explain this.
3. Set down in figures ninety-five millions five hundred and seven thousand and six.
4. Express the results of the following: $427 \times 863 - 1386 - 829$.
5. What is the difference between arithmetical and geometrical ratio?
6. Add together £677 1s. 0d., £3697 14s. 7½d., £5674 16s. 7½d., £1546 19s. 7½d., £5767 2s. 6d., £5634 0s. 0½d., £1767 17s. 0½d.

G.

1. What is the $\frac{2}{3}$ of £5 2s. 9d.?
2. What is the price of 7 acres, at 2s. 6d. per perch?
3. If 47 acres of land be set at the yearly rent of £70 10s., find the rent per acre.
4. Express the results of the following: $57950 \ 11 \ 9\frac{1}{2} \times 53$;
 $5713203 \ 13 \ 4\frac{1}{2} \div 576$
5. Find the price of 29 cwt. 2 qrs. 14 lbs., at £4 19s. 11d. per cwt.
6. What is the annual premium payable on a policy of insurance for £2475, at £2 2s. 4d. per cent?

BANK OF IRELAND.

A.

1. Find by Practice the price of 17 cwt. 2 qrs. 14 lbs., at £3 17s. 6d. per cwt.
2. Find by Practice the price of 704 ozs. 11 dwt. 20 grs., at 11s. 4d. per ounce.
3. Find in English money the value of 2056 francs, 56 centimes, the rate of exchange being £1 = francs 25, centimes 28.
4. Add together the fractions $\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{8}$, $\frac{1}{2}$.
5. Convert these into decimal fractions as far as six places; add and compare the results.
6. What is the difference between the Bank discount and the true discount? Illustrate the statement by finding the two discounts on £100 for 120 days, at 5 per cent.
7. Calculate the interest on £119 15s. 6d. for 97 days, at $3\frac{1}{2}$ per cent.
8. According to the Corporation account, the average quantity of Vartry water sent over Callow-weir during the week ending the 1st of October, was 15299536 gallons, of which the City received 7144365 gallons, the Townships 1543994 gallons, the remainder running waste. Find the amount of waste, and state all these figures (as percentages as far as two places of decimals) of the total amount delivered.
9. A trustee sells £4000 India five per cent. stock when the price is 108 $\frac{1}{2}$, and invests the proceeds in the Government 3 per cent. stock, the price being 92 $\frac{1}{2}$. Calculate the loss of income, broker's commission on each transaction being $\frac{1}{2}$ per cent.
10. State the rules for converting, at sight, £ s. d. into £, florins, mils, and *vice versa*.

B.

1. Find by Practice the rent of 140 acres, 3 roods, 16 perches, at £3 14s. 6d. per acre.
2. Find by Practice the price of 119 cwt. 2 qrs. 15 lbs., at £1 13s. 10d. per cwt.
3. Reduce 2s. 1d. in the £; also 105 grains in the ounce *avoirdupois*, to percentages
4. Reduce the improper fraction $\frac{17}{12}$ and $\frac{11}{8}$ to the decimal form as far as seven places.
5. Find by how much per cent. the former exceeds the latter number.
6. Illustrate the process of contracted multiplication, in finding to four places of decimals the square and cube of 3.1416.
7. Find the interest on £115 17s. 6d. for 93 days, at $4\frac{1}{2}$ per cent., by the "three ten and ten rule."

8. Assuming with Continental merchants that the commercial year consists of 360 days, find the interest in the last question.

9. Calculate the discount at 4 per cent. per annum, on a bill of exchange of £120, drawn at 90 days, twenty-seven of which have already expired.

10. British standard gold is $\frac{11}{12}$ fine, that is eleven parts out of twelve are pure gold; and 40 lbs. troy of standard gold is coined into 1869 sovereigns. Calculate from these data the value of one grain of pure gold in pence and fractions of a penny.

C.

1. Find by Practice the rent of 110 acres, 3 roods, 21 perches, at £4 3s. 10d. per acre.

2. Find by Practice the price of 710 ozs. 18 dwts. 10 grs. of plate, at 7s. 10 $\frac{1}{2}$ d. per ounce.

3. Convert the following fractions to the same denomination: $\frac{2}{3}$, $\frac{5}{6}$, $\frac{7}{8}$, $\frac{11}{12}$.

4. Convert the vulgar fraction $\frac{11}{12}$ to the decimal form as far as seven places.

5. Apply the method of contracted multiplication to find the cube of the number 3.14159 to five places of decimals.

6. State the rules for converting £ s. d. into £, florins, mils, and *vice versa*.

7. Explain the rule for finding the interest on a sum of money at a given rate per cent. per annum for a given number of days by the "three ten and ten" rule, and exemplify, by finding the interest on £800, at $4\frac{1}{2}$ per cent., for 115 days.

8. State the rule for finding the Bank discount on a bill of exchange, and exemplify by finding the discount on a bill for £120, at $4\frac{1}{2}$ per cent., drawn 10th April, at six months, and discounted 28th May.

9. A man invests £10,000 in 3 per cent. stock, when the price is 92 $\frac{1}{2}$. Broker's charges $\frac{1}{2}$ per cent.; find the income he receives, and the rate per cent. on his investment.

10. State the number of days in each quarter of the year, commencing 1st January, and find the amount due to a man whose salary is £750 a year, ceasing on the 27th August, salary payable quarterly.

D.

1. Find by Practice the price of 113 cwt. 3 qrs. 5 lbs., at £3 17s. 9 $\frac{1}{2}$ d. per cwt.

2. Find by Practice the rent of 105 acres, 2 roods, 37 perches, at £4 15s. 8d. per acre.

3. An ingot of standard gold weighs 14 lbs. Avoirdupois: reduce this weight to *ozs.*, *dwt.*, and *grs.*, and find by Practice its price at £3 17s. 10½d. per ounce.

4. Find by the method of *Contracted Multiplication*, as far as four places of decimals, the continued product of 3.1465, 2.0187, 11.453, and 7.324.

5. If £100 of 3 per cent. stock be sold at 92½, calculate the price, supposing 127 days' interest to be due, and brokerage to be at the rate of 2s. 6d. per cent.

6. If £250 be invested in 3 per cent. stock at the same price, brokerage, and number of days of interest due as in the last question, calculate the amount of stock which must be bought, its value in cash, the interest payable, and the brokerage. Fractions of a penny in each Answer may be rejected.

7. State the "three ten and ten" rule for finding the interest on a sum of money for a given number of days, and by means of it calculate the interest on £100, at 4 per cent. for 73 days.

8. Find the "Bank discount" at 6 per cent. on a bill of exchange for £500, drawn at six months on the 10th May, and discounted 28th June.

9. Find that which is called the "true discount" in the last question.

10. Assuming with Continental merchants that the year consists of 360 days, find the Bank discount in question 8.

E

Time allowed—two hours.

1. A bag of sovereigns was found to weigh 10 lbs. 11 oz. 12 drs. (avoirdupois weight). What was its true weight in lbs. oz. dwt. grs.?

2. What decimal multiplied by 125 will equal the sum of $\frac{5}{8}$, $\frac{7}{16}$, $\frac{3}{4}$, .09375 and 2.46?

3. Reduce to its simplest form $\frac{2\frac{1}{2}}{3\frac{1}{2}} + \frac{1\frac{1}{2} - \frac{5}{8}}{1\frac{1}{2} + \frac{5}{8}} - 1\frac{3}{8}$?

4. The length, breadth, and height of a room are 7 yds. 1 ft. 3 in., 5 yds. 2 ft. 9 in., and 4 yds. 9 in. respectively—what will be the cost of papering it with paper 2 ft. wide, at 9d. per yard?

5. What sum, lent on the 1st of January, 1840, at 5½ per cent. per annum, will amount to £1,000 on the 29th of September following?

6. What sum must be insured, at 4½ guineas per cent., in order to recover £1,250 *above cost of insurance*, in case of loss?

7. Find the true discount of a bill of £447 12s. 6d., drawn June 23rd, at 6 months, discounted July 8th, at 6½ per cent. per annum?

8. A person buys £2,950 stock in the 3 per cents. at $83\frac{1}{2}$: when the funds have fallen $2\frac{1}{2}$ per cent. he sells out, and invests the proceeds in 5 per cent. railway shares at 108. What alteration will it make in his income?

9. A owes B a debt, payable in $7\frac{1}{2}$ months, but he pays $\frac{1}{2}$ in 4 months, $\frac{1}{2}$ in 6 months, and $\frac{1}{2}$ in 8 months, when ought the remainder be paid?

10. A and B can do a piece of work in $2\frac{1}{2}$ days; A and C can do the same in $2\frac{1}{4}$ days; and B and C can do it in $3\frac{1}{2}$ days; in what time could A B and C do it separately, and all together?

ROYAL COLLEGE OF SURGEONS IN IRELAND.

A

PRELIMINARY EXAMINATIONS.

1. Find the income tax on 500 guineas, at 7d. in the £1.

2. Find the aggregate weight of four packages, of which one is 0.276 tons, another 0.625 cwt., a third 75.8 lb., and the fourth 1.96 qr.

3. If a bankrupt owe £763 15s., and his assets amount to £133 13s. 1½d., how much can he pay in the pound?

4. Extract the square root of 0.0633679929 to five decimal places.

5. Find the interest on £179 12s. 11d. for one year and seven months, at 5 per cent. per annum.

6. From the sum of $\frac{1}{2}$ and $\frac{1}{3}$ take the sum of $\frac{1}{4}$ and $\frac{1}{5}$.

Double credit will be allowed for each of the following questions:—

7. How many meshes are there in a square foot of wire netting, each mesh being $\frac{1}{8}$ of an inch long, and $\frac{1}{4}$ of an inch wide?

8. If 100 oz. of gold be worth 1428 oz. of silver, and 6 oz. of silver be worth 1 oz. of platinum, and 3 oz. of platinum worth 1380 oz. of copper, calculate the weight of copper which is worth 1.125 lbs. of gold, troy.

B

1. Reduce 16065 minims to pints, &c.

2. Add together O. iv, $\frac{2}{3}$ xiv, 3 iv, min. xxv, O. liias, 3 vias, 3 ias, min. lv, and O. ias, $\frac{2}{3}$ vias, 3 iias, min. xc.

3. Divide £185 8s. 9d. into nine equal parts.

4. Find the least common multiple of 8, 14, 18, and 21.

5. Multiply .0015 by 55, and tell how much of a pint the product is.

6. In what time will 50 men do a piece of work which 24 men can do in three days?

7. What is the $\frac{1}{2}$ of the $\frac{1}{4}$ of the $\frac{1}{2}$ of £7 10s., and what decimal of £ is the answer?

8. £463 16s. is to be raised on land valued at £6184; what is the rate per £?

9. How many grains in 1 gramme+1 decigramme+1 centigramme+1 milligramme?

10. What is the present worth of £500, due 11 months hence, at 4 per cent?

O

1. If you have walked 128 Irish miles, how many English miles is that equal to?

2. Reduce $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{6}$ to fractions, with a common denominator.

3. Find the sum of $2\frac{1}{2}$, $4\frac{1}{3}$, $5\frac{1}{5}$, and the difference of $\frac{1}{2}$ and $\frac{1}{3}$.

4. Express 10s. 9d. as the decimal of £1, and find the value in shillings, &c., of £5937.

5. Reduce $\frac{1}{2}$ and $\frac{1}{3}$ to decimals.

6. If you pay 8s. 9d. duty on a pound of opium, how much will you have to pay on one hundred weight?

7. What interest should you receive for £99 2s. 4d., at 6 per cent. per annum, at the end of two years and nine months?

8. What is the product of 81×82 ?

APOTHECARIES' HALL.

1. If the mean daily excretion of sugar by a diabetic patient be 5680 grains in a daily discharge of urine averaging 160 ozs., calculate the percentage of sugar in the urine, 1 oz. equivalent to 487.5 grains.

2. A fluid, containing Prussic Acid, is found by volumetric analysis to require for neutralization 35 measures of a standard solution of Nitrate of Silver. What amount of Prussic Acid does the fluid contain, if 100 measures of the standard solution correspond to 5.4 grains of Prussic Acid?

3. Find $\frac{1}{2}$ of 1 mile. 4. Subtract $\frac{1}{2}$ from $\frac{1}{3}$.

5. Add $1\frac{1}{2}$ to $2\frac{1}{2}$, and express the result in decimals.

6. Find the interest on £440 10s. 6d., for one year, at 5 per cent.

7. If a sample of Quinine be found adulterated to the extent of $\frac{1}{4}$ th of the whole, calculate the per-centage of pure Quinine in the sample.

8. The total expense of constructing a building was £70,348; two years were consumed in the work. Estimate the average expense *per diem*, allowing 365 days (less 52 Sundays) to the year.

NOTE.—The above exercises contain the questions given at three different Examinations, the two last being those set on 21st October, 1875.

H

The next 11 pages are framed on the model of the cards set by the Inspectors at the Annual Results Examinations in Irish National Schools.

On each card the following caution is printed, and should be rigidly attended to by the pupil:—"Be careful to enter at the head of your paper the letter on this card, and to place the No. of each question attempted in the margin."

Though these exercises are constructed after the model of cards intended for boys, they may be profitably practised by girls also. Cards for 4th Class are the same for boys and girls, and in 5th and 6th Classes the cards for girls are very little less difficult than those for boys—of this series the last four cards, however, furnish precise specimens of girls' cards.

Teachers should constantly exercise their pupils on the prescribed money addition. For the best method of doing so, see Preface.

For additional exercises, no better can be found than those in this treatise, from page 62 to page 66.

NOTE.—In order to afford variety, repetition of the same class of questions has been avoided. Hence, the pupils of each class should work over, several times, the questions prescribed for the class.

FOURTH CLASS.

A

1. Reduce 693748 farthings (1) to guineas, etc. (2) to pounds, etc.
2. How much remains out of £5, after each of three men has been paid 17s. 6d.?
3. Multiply £13 11s. 7½d. by 347.
4. How many florins in 96,000 half-pence?
5. Multiply the sum of eight hundred and forty thousand one hundred and one, and thirty thousand and nineteen, by four thousand and thirty.
6. Write down (1) the highest digit; (2) the lowest; (3) the highest number that can be expressed by three digits.

B

1. How many pounds, &c., in 446960 farthings?
2. Subtract £1 11s. 0½d. from £3.
3. Divide £300 11s. 2½d. by 89.
4. What sum is required to pay each of 19 men £1 19s. 6½d.?
5. What is a unit?
6. How many labourers, each getting 16s. 3d., can be paid out of £13?

C

1. How many florins in 19,656 fivepenny pieces? How many guineas?
2. Multiply 187982 by 7090, and divide the product by 487.
3. How many francs of 10d. each in 65 ten-pound notes?
4. Divide £1,000 0s. 11½d. by 87.
5. Define Notation.
6. Write out the following tables:—Long Measure, Square, Time.

D

1. Subtract £1 0s. 6½d. from £100 0s. 5d.
2. From 10 guineas take 3 half-crowns, and divide the difference by 18.
3. Multiply £17 19s. 7½d. by 101.
4. How many half-pence in 18 half-guineas
5. Define Addition; also Division.
6. Divide £110 19s. 3d. by 132, using factors.

E

1. How much will remain out of a half-crown, after paying for three peaches, which cost 2½d. each?
2. Subtract £100 0s. 6½d. from £1000 0s. 1½d.
3. What is the sum of nineteen addends, each £1 17s. 11½d.?
4. How many times can you take £3 14s. 6½d. out of £33 11s. 2½d., and what remainder then have you in pence?
5. Write down, in two separate columns, the terms employed in the simple rules of Subtraction and Multiplication.
6. Divide £27,369 6s. 2d. by 4792.

FIFTH CLASS.—1st STAGE (BOYS).

F

1. A tenant holding a farm of 187 acres, 3 roods, 24 perches, pays £1 18s. 9d. per acre. Find, by Practice, the yearly rent.
2. If 1½ stones of sugar cost 6s. 8½d., what is that for 1 cwt. 3 lbs.?
3. Divide 786 acres, 8 perches, into 407 equal plots.
4. At 5½d. per score, what will 1,180 nails cost?
5. Reduce 674,025 inches to miles, furlongs, etc.
6. Write out the letters used in the Roman Notation.

G

1. A person pays £11 1s. 3d. poor rate on his valuation of 5d. in the £. What is his rated property?
2. What is it that makes the difference between the simple rules and the compound rules?
3. Find, by Practice, the value of 2 tons, 3 cwt., 2 qrs., 14 lbs., at £2 17s. 6d. per cwt.
4. Divide 210° 1' 26" by 19.
5. What is the price of a sack of flour containing 2 cwt., 3 qrs., 14 lbs., at 1s. 9d. per stone?
6. How many rails, each weighing 2½ stones, can be made from 3 tons, 2 cwt., 2 qrs. of iron?

H

1. In 15 acres, 1 rood, 10 perches, 4 yards, how many square inches?
2. Define a composite number, and give an example of one.

8. How many ells (French) can I buy for £348, the price being 3s. 7½d. per yard?

9. The price of 13 cwt., 1 qr., 21 lbs. is £30 4s. 8½d.; what is that per cwt.?

10. If 7 cwt. 2 qrs. cost 15 guineas; what will 2½ stones cost?

11. If 1 lb. avoirdupois cost £1 1s. 10½d., what is that per lb. troy?

I

1. A plantation acre costs 35s.; what is that for a statute acre?

2. Find, by Practice, the cost of 5,896 books at 11½d. each.

3. How does Reduction Descending differ from Reduction Ascending?

4. Divide thirty-five millions one thousand and ten, by twenty thousand and forty-nine, and show the remainder.

5. How many suits of clothes, each requiring 3 yards, 3 qrs., 2 nails, can be cut from a piece of cloth containing 158 yards, 3 qrs., 2 nails?

6. The digging of a canal, 10 Irish miles long, cost £28,000; what should be the cost of another canal 10 statute miles long?

J

1. Define Measure, Common Measure, and Greatest Common Measure?

2. If 317 lbs. 0½ oz. of tea is to be served out in rations of 1½ oz., how many men can be helped?

3. What is the cost of 5½ tons of coals, at £1 8s. 2d. for 17 cwt. 3 stones?

4. Find the price of 11 yards, 2 qrs., 3 nails of silk, at 18s. 4d. a yard.

5. Reduce 20,011 grs. to lbs., ozs., &c.

6. How many ounces of flour can be had for 8½d., at £18 13s. 4d. per ton?

K

1. If a square yard of building ground costs 1s. 7½d., what is that per acre?

2. Reduce 10,000,000 inches to miles, furlongs, &c.

3. Divide 19 tons, 16 cwt., 2 qrs., 13 lbs., by 67.

4. Define Multiple, Common Multiple, and Least Common Multiple.

5. Find the cost of 3 stones 7½ lbs. of tea, at 2s. 8½d. per lb.

6. If 19 cwt. of hay cost £2 4s. 4d., what will 2½ stones cost?

L

1. Define Factor, Ratio, Proportion.

2. Find, by Practice, the cost of 4768 sheep, at £1 17s. 10½d. each.

3. After selling the following quantities out of a ton of flour, what quantity remains? 3 stones, 7 lbs.; 2 cwt., 3 qrs.; 27 lbs.; 10 ounces; and 1 cwt., 1 qr., 10 lbs.

4. A landlord divides his property amongst 19 tenants, giving to each 39 acres, 3 roods, 10 perches; what is the extent of his estate?

5. In 5482 half-sovereigns how many 7s. pieces?

6. Take a shilling and a half-penny from a pound.

FIFTH CLASS.—2nd STAGE (Boys).

M

1. A grocer gave 3 cwt. of tea, valued at 2s. 9d. per lb., for cloth at 1s. 4d. per yard; how many yards did he receive?

2. Divide, decimally, three ten thousandths, by fifteen thousandths.

3. How does Compound Proportion differ from Simple Proportion?

4. Supposing $\frac{1}{2}$ of an estate to be worth £1011, what is the remainder worth?

5. Multiply 13 acres, 2 roods, 10 perches by 17.

6. If 13 men earn £151 13s. 4d. from 29th July to 1st November, both days included; how much ought 4 men earn in a week (6 days)?

N

1. Find the sum and quotient, the lees being the dividend of $3\frac{1}{2}$ and $5\frac{1}{3}$.

2. Multiply 7 days, 10 hours, 12 minutes, $10\frac{1}{2}$ seconds by 101.

3. If £70 10s. 0d. can be earned by 14 masons, working 9 hours a day for 12 days, how much can be earned by 10 masons, working 7 hours a day for 8 days?

4. Find, by Practice, the price of a gold dish weighing 4 lbs., 3 ounces, 14 dwts., at £4 1s. 8d. per ounce.

5. After multiplying the difference between .07 and .0003 by .0018, divide the result by .0051.

6. What is a concrete number?

O

1. Find the cost of 13 yards, 2 qrs., 3 nails of cloth, at 1s. $10\frac{1}{2}$ d. per nail.

2. Find $2\frac{1}{2}$ times the sum of $3\frac{1}{2}$, $4\frac{1}{3}$, $\frac{1}{4}$, $1\frac{1}{2}$.

3. In $\frac{1}{2}$ acre how many square inches?

4. If $1\frac{1}{2}$ acres of land are rented at £2 12s. 3d., what ought a farm of 30 acres, 2 roods, $13\frac{1}{2}$ perches cost?

5. In a field which contains 7,846,795 square inches, how many acres, roods, etc.?

6. In reducing fractions to a common denominator, how is it that their values are not altered?

P

1. Write out the rule for finding the Greatest Common Measure between two numbers.
2. Reduce 72·6 sq. feet to the decimal of 220 square yards.
3. Express 746,398 gills in loads, quarters, &c.
4. Write out the multipliers in the short rules in Practice applicable to each case, for (1) acres, roods, perches; (2) cwts., qrs., lbs.; (3) ozs., dwts., grains; (4) yards, qrs., nails; (5) tons, cwts., qrs.
5. Where 6 loads, 3 qrs., 3 pecks of corn are produced from $7\frac{1}{2}$ acres, what quantity ought to be expected from 5 acres 10 perches? (Ans. in loads, qrs., &c.)
6. How many grains (1) in an oz. troy; (2) in an oz. avoirdupois?

SIXTH CLASS.—1st YEAR (Boys).

Q

1. What principal will amount to £231 12s. 6d. in $2\frac{1}{2}$ years, at 4 per cent. per annum, simple interest?
2. Reduce $7\frac{3}{4}$ to the fraction of $8\frac{1}{2}$.
3. A dealer sells cloth at 4s. 3d. the yard, and so gains $6\frac{1}{2}$ per cent. How much per cent. will he gain by selling at 4s. 6d. per yard?
4. Extract to 4 places the square root of .074.
5. Find the number of horses which, in 7 days of 9 hours, will plough as many acres as 12 horses, working $10\frac{1}{2}$ days of 10 hours.
6. Define the terms Rate, Amount.

R

1. Find the true discount on £953 6s. 8d., for 8 months, at 6 per cent. per annum.
2. Assume the metre = 39·3 inches, and find how many metres in a distance of 58·95 leagues.
3. £1 2s. 9½d. is $\frac{1}{11}$ of a certain sum. Find it.
4. Find exactly the cube root of $181\frac{2}{3}$.
5. At what rate per cent. per annum will £1250 arise from £1,000 in 4 years?
6. A fraction may be increased in two ways—state them.

S

1. How much water must be added to 210 gals. of brandy, which cost 12s. 6d. per gal., to reduce it to 7s. 6d. per gal.?
2. Give a short rule for finding the interest for days (1) at 5 per cent. per annum; (2) at any rate.
3. I sell out £3,000 of 4 per cent. stock at 90, and invest the cash received in the 3 per cents. at 81. Find the alteration in income.
4. Tea which cost 2s. 9d. per lb. is to be sold so as to gain $12\frac{1}{2}$ per cent., find the selling price per lb.

5. What fraction of 3 cwt. is $\frac{1}{4}$ of $\frac{1}{2}$ of a stone?
6. If an acre of land cost '08125 of £20, what will '0064 of 3 roods cost?

T

1. If $1\frac{1}{2}$ statute acres cost £1 10s. 3d., what will 140 plantation acres cost?
2. Divide '00093 into '00006231.
3. Give the rules (1) for finding the true discount; (2) the commercial.
4. Find in degrees, minutes, seconds, $\frac{1}{3}$ of $57^{\circ} 17' 45''$.
5. Express in drams 0318 of $2\frac{1}{4}$ tons.
6. How much money ought 18 mules earn in 27 days of 9 hours each, if 12 horses, working 81 days of 10 hours, earn £400, the work of 5 horses being equal to that of 6 mules?

U

1. Give the rule for proving multiplication by casting out the nines.
2. Multiply 3 leagues, 2 miles, 3 furlongs, 10 perches by $15\frac{1}{2}$.
3. If a ring contains 237·697 grains of gold, how many such rings can be made from a bar containing 41 lbs. 3 oz. 4 dwt. 1 gr.?
4. How many avoirdupois lbs. can be had for £21 10s., if 70 troy lbs. cost £86?
5. If £120 gain £7 10s. in $3\frac{1}{2}$ months, what sum must be lent to gain £10 in six months?
6. Find the simple interest on £750 10s. for 3 years 5 months, at $6\frac{1}{2}$ per cent. per annum, true to nearest penny.

V

1. If 5 cows or 3 horses consume a quantity of hay in $7\frac{1}{2}$ days, how long would the hay last 1 cow and 1 horse?
2. Extract the cube root of 343735525125.
3. A man sells tea at 3s. 9½d. per lb., and loses thereby 9 per cent; what must he have paid for $1\frac{1}{2}$ cwt.?
4. Write the rule for finding the omitted term of a proportion when any three are given.
5. What decimal of 40 acres is $\frac{3}{4}$ of $\frac{1}{2}$ of 1 rood 16 perches.
6. Simplify and express decimally $\frac{1\frac{1}{2} - \frac{3}{4}}{7\frac{1}{2} - 9 \times \frac{1}{2}}$

W

1. A speculator sells stock at $90\frac{1}{2}$, which he had bought at $87\frac{1}{2}$, and gains thereby £315; how many shares did he buy?
2. Working fractional remainders—find, by Practice, the cost of 24 lbs. 11 oz. 10 dwts. 5 grs., at £3 7s. 6d. per oz.
3. Divide £17 10s. between X, Y, and Z; give X $\frac{1}{2}$ more, and Z $\frac{1}{3}$ less than Y.
4. By factoring the denominator of a vulgar fraction in its lowest term, it can be ascertained if the decimal resulting from it be finite. What must be the nature of the factors?

5. What is the difference between the simple and compound interest of £400 for 8 years, at 5 per cent. per annum.

6. Extract the square root of $7\frac{1}{2}$.

X

1. What do you understand by the *local* value of a digit?

2. Divide, to the lowest denomination, 102 acres, 23 perches, $19\frac{1}{2}$ yards, by 119.

3. What sum now lent will produce an amount of £7006 10s. 0d. in $3\frac{1}{2}$ years, at $2\frac{1}{2}$ per cent. simple interest?

4. What fraction of an hour is $1.5''$, and what decimal of a cwt. is $\frac{1}{8}$ lbs.?

5. Find the time in months in which £173 10s. 0d. will gain £3 12s. 3d., at 3 per cent. per annum, simple interest.

6. It is important to remember the square roots of 2 and 3. Extract each to 3 decimal places.

Y

1. A man makes £300 a year by investing £7100 in stock, which yields £1 10s. 0d., per share; what did he pay for each share?

2. If a gain of 10 per cent. is made on $\frac{1}{3}$ of goods, the whole of which cost £120, and 15 per cent. on the remainder, how much gained on the entire?

3. Three men can do a piece of work in 4 days; two of them can do it in 6 days; how long will it take the third man to do the work?

4. What is the short rule for reducing pounds, shillings, and pence to the decimal of a pound?

5. What is the loss on a purchase of 510 lbs., which I bought as avoirdupois weight for £21 17s. 6d., but for which I was charged as troy weight?

6. Exhibit as a decimal the product of $\cdot 17$ and $\cdot 16$.

Z

1. Extract, to 5 places, the square root of $\cdot 00007$.

2. A butcher has to lower his meat $1\frac{1}{2}$ d. in the pound; what does he lose on a carcass weighing 5 cwt., 1 qr., 7 lb.?

3. Find, true to the nearest penny, the amount of £1760 lent for 4 years, at 3 per cent. per annum, compound interest.

4. What is the true discount on £613 4s. 2d., from 13th October to 17th December, at $4\frac{1}{2}$ per cent. per annum?

5. Write out the three following ratios in lowest terms.—(1) Irish square measure to English; (2) English long measure to Irish; (3) Avoirdupois weight to Troy.

6. If the produce of an acre of ground yields £21 when corn sells at 31s. per bushel, what quantity (in acres, &c.) ought to yield £147 when corn sells at 28s. per bushel?

A¹

1. What is the cost of a silver salver, weighing 2 lbs., 3 ounces, 2 dwts., 11 grains, at 7s. 10½d. per ounce?
2. Write out the short rule for finding the interest of any sum for days, at any rate per cent. per annum.
3. Multiply, decimally, seventy thousandths six hundred and fifty millionths, by thirty-nine thousandths, and divide the result by four thousandths five hundred millionths.
4. If in 7 days 15 men, working 8 hours a day, earn £7 7s. 0d., in how many days of 9 hours each can 8 men earn 21 guineas, the work of five of the former being equal to that of four of the latter men?
5. How many acres, etc., in 19 farms, supposing each to contain 73,894 square yards?
6. If 19½ ounces of tea cost 4s. 10d., what will be the price of 2 lbs. 11½ ounces?

B¹

1. Find the simple interest of £870 17s. 6d. for 3 years 7 months, at 4½ per cent. per annum.
2. If 8 men build a wall in 35 days of 6 hours, find, in days, the time in which 9 men, employed 7 hours a day, will do the same work, the latter working 1½ times as hard as the former.
3. Simplify $\frac{\frac{3}{4} + \frac{2}{3} + 1\frac{1}{4}}{\frac{1}{2} + \frac{1}{3} - \frac{1}{6}} \times 33\frac{1}{3}$; express the result decimally.
4. Find, in days, the time in which £220 will produce £36 interest, if £275 make £27 7s. 6d. in 73 days.
5. If 17 acres, 3 roods, 10 perches cost £41 11s. 3d., what is that for 1 acre 3 perches?
6. What are the rules for calculating the yearly wages at so many pence per day (1) including Mondays; (2) excluding them?

SIXTH CLASS.—2nd YEAR (Boys).

C¹

1. Give the rule for proving Multiplication, by casting out the nines.
2. Raise 1·61 to the third power. Express the answer as a decimal to 4 places.
3. Reduce $\frac{1}{17}$ to a decimal, and extract, to four places, the cube and square roots.
4. Distribute 1,075 acres of land between three farmers, giving the first 2½ times the second, and the second 1½ times the third.
5. By selling sugar at 4s. 7d. per stone, 10 per cent. is gained; what per cent. is gained by selling at 4s. 9d. per stone?
6. What o'clock is it between five and six when the hands of a watch are together?

D¹

1. In 4 years £10,000,000 lent at compound interest became £11,255,068 2s. What rate was allowed?
2. Write the rules for finding in the most common cases the sum (a) of an arithmetical, (b) of a geometrical series.
3. What is the difference in roods and perches between .075 of 100 acres, and .00625 of 1,100 acres?
4. What, in the United Kingdom, is understood by (1) standard gold? (2) standard silver?
5. Find the value 3.16 of $2\frac{1}{2}$ cwt. - $1\frac{1}{2}$ of 2 st. 4 lbs. + $159\frac{1}{4}$ of 1 cwt. 2 qrs. 12 lbs. Express the Answer in cwts., qrs., and lbs.
6. If 18 gallons of a mixture of 3 parts water to 11 pure spirit cost £14 17s. 0d., what ought a cask containing 31 gallons of pure spirit cost?

E¹

1. How many lbs. of tea at 2s. 8d. must be mixed with $1\frac{1}{2}$ cwt. at 4s. 1d. per lb., so as to be able to sell at 3s. 2d?
2. Reduce t 567e in the duodenary scale to the septenary—(t = 10, e = 11.)
3. The least term of an equidifferent series = 3, the sum = 5,100, and number of terms = 100; find the greatest term.
4. Write out the rule for finding the true discount of any sum, the time and rate being given.
5. Which is the better investment— $5\frac{1}{2}$ per cent. bank stock at $118\frac{1}{2}$, or 3 per cent. consols at 76? What income arises from investing £8,987 in the latter?
6. In 315 French ells how many English ells? How many Flemish?

The next six questions were given at the College of Surgeons' Entrance Examination, July, 1878. The Paper suits for 6th Class, Second Year.

F¹

1. Multiply ten thousand and ninety by one hundred and nine.
2. Divide $1\frac{1}{2}$ by $\frac{1}{2}$, and multiply the product by $\frac{1}{2}$.
3. Subtract .008 from .8, and divide the difference by .125.
4. In this latitude the sun is 16 hours daily above the horizon in June, and 8 hours in December. Working between sunrise and sunset, how many days would 5 men take to do a piece of work in June which 15 women accomplished in ten days in December, supposing the relative strengths of man and woman to be as 3 to 2?
5. I follow, at the rate of $3\frac{1}{2}$ miles per hour, a man who has had forty minutes' start of me, and walks at the rate of $2\frac{1}{2}$ miles per hour. How far shall I have gone when I come up with him?
6. A syphon empties a cistern in four minutes, while it is filled from a cock in five. If both conduits operate simultaneously on the cistern already full, in what time will it be emptied?

G¹

1. If a ration of meat weighs 1 lb., and costs 6d. when meat is 48s. 8d. per cwt., what will be the cost of supplying a crew of 56 men each with a ration of 10 ounces, when the price has risen to 80s. per cwt.?
2. A ship and its cargo are valued at £48,200; the ship alone is worth $1\frac{1}{2}$ times the cargo; find the value of the latter.
3. Express in lowest whole numbers the ratio of an ounce troy to an ounce avoirdupois.
4. A grocer mixes sugars which cost 3d., $3\frac{1}{2}$ d., and 5d. per lb., so that he may sell at $4\frac{1}{2}$ d. per lb.; how many lbs. of each in 1 cwt. of the mixture?
5. Give the common rule for solving problems in Equation of Payments.
6. Two graziers hire a field for 7 months, one puts on 8 cows, the other 5 cows; how much ought each to pay, the whole rent being £12 0s. 0d.?

H¹

1. Find the true present worth of £173 12s. 6d., for $3\frac{1}{2}$ years, at $4\frac{1}{2}$ per cent per annum.
2. Under same conditions, find the Bank discount, true to nearest penny.
3. If when flour is 60s. per bushel, 20s. worth suffice 8 men for 5 days, what will be the cost per bushel so that 15s. worth may maintain 3 men for 6 days?
4. In the Roman Notation write out, each in two different forms, (1) 500; (2) 1000.
5. When $1\frac{1}{2}$ st. sugar cost $7\frac{1}{4}$ s., what will 1 lb. cost?
6. A room 20 ft. $\times$ 16 ft. $\times$ 11 ft. is to be papered with paper 22 in. wide, how many doz. yards are required?

FIFTH CLASS.—1st STAGE (GIRLS).

I¹

1. Divide 47,394 acres, 2 roods, 18 perches by 879.
2. If flour sells at £16 per ton, how many ounces can be had for $1\frac{1}{2}$ d.?
3. Give the rule for finding the greatest common measure of two numbers.
4. Find, by Practice, the price of 15 lbs., 3 ounces., 6 dwts., 16 grains, at 17s. 9d. per ounce.
5. If $17\frac{1}{2}$ yards of cloth cost £3 19s. 4d., what will 3 yards 3 quarters cost?
6. How many girls can make in $48\frac{1}{2}$ days as many dresses as 10 girls in $19\frac{1}{2}$ days?

FIFTH CLASS.—2nd STAGE (GIRLS).

J¹

1. Divide 1.07 into .007883.
2. In 38,967,506 square inches, how many acres, roods, etc.?
3. Multiply $\frac{1}{4}$ by $1\frac{1}{2}$, and divide the result by $2\frac{1}{2}$.
4. If 15 girls in 16 days of 9 hours each can do a certain work, in how many days of 10 hours each ought 8 girls to do the same?
5. What is the cost of $15\frac{1}{2}$ cwt. at $\pounds 7\frac{1}{2}$ per cwt.?
6. Write out the signs for the operations performed by the four simple rules; also, the signs of equality, ratio, and proportion.

SIXTH CLASS.—1st YEAR (GIRLS).

K¹

1. What decimal of $\frac{3}{4}$ of a ton is 1 cwt., 2 qrs., 21 lbs.?
2. How do you increase a number 125 times, using no rule but simple division?
3. Find, by Practice, and with fractional remainders, the price of 17 yards, 3 qrs., 2 nails, at $\pounds 1$ 15s. $7\frac{1}{2}$ d. per yard.
4. In how many months will $\pounds 320$ lent at $4\frac{1}{2}$ per cent. per annum gain $\pounds 40$, when $\pounds 170$ lent at 4 per cent. can gain $\pounds 40$ in 8 months?
5. Simplify $1\frac{1}{2}$ of $1\frac{1}{2} + \frac{1}{2} - \frac{1}{2}$
 $3\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} - \frac{1}{2}$ of $1\frac{1}{2}$
6. Find the precise value of $\cdot 2$ of $\cdot 277$ of 3 guineas.

SEVENTH CLASS.—2nd YEAR (GIRLS).

L¹

1. A bill of $\pounds 115$ 1s. 8d. is drawn on 17th August, and is payable on the New Year's day following. What sum will pay it on 1st November, allowing a discount of 5 per cent. per annum?
2. By selling goods for $\pounds 1$ 4s. $1\frac{1}{2}$ d. I lost $3\frac{1}{2}$ per cent. Express as a percentage my position when I raise the price to $\pounds 1$ 7s. 6d.
3. Given the three numbers in a problem in Simple Proportion, write the rule for placing them in the statement.
4. What is the cost of $111\frac{1}{2}$ articles at $\pounds 22\frac{1}{2}$ each?
5. How much must I invest in the 3 per cents. at $87\frac{1}{2}$, so as to have an annuity of $\pounds 97$ 10s.?
6. What is the amount of $\pounds 378$ for 4 years, at 3 per cent. per annum, compound interest? In the answer the fraction of a penny may be neglected.

ADDITION OF MONEY FOR NATIONAL SCHOOLS,

In accordance with Results' Programme for 1885.

For plan of working, see Preface.

(1)			(2)			(3)		
£	s.	d.	£	s.	d.	£	s.	d.
407	16	9½	1	4	9	47689	18	7½
18	17	10½	10	16	1½	11	14	9½
107	11	11½	2436	5	10½	836	10	8½
27843	6	9½	407	13	6½	1	4	10½
460	10	4	59613	7	8½	0	16	9
0	18	9½	49	13	8	3016	17	5½
189	7	11½	2020	11	5½	209	18	7½
54	19	1½	47	19	10½	1476	16	11½
1109	1	2½	910	15	6½	73895	1	1½
8	6	7½	698417	11	2½	104	11	11½
20004	15	9½	43	16	5½	10	10	10½
1001	10	7½	1013	7	10½	4769	19	9½
463	5	9	19	11	6	7156	18	7½
7615	11	3½	407	6	9½	39	6	5
47	19	6½	18	5	4½	478	17	9½

(4)			(5)			(6)		
£	s.	d.	£	s.	d.	£	s.	d.
29	10	6½	156	14	10½	8006	16	7½
9047	1	6½	2002	11	6½	497	18	9½
8	17	10½	9	8	11½	11	7	8
109	9	9½	406	17	8½	6	5	10½
47693	10	5½	10	5	9½	5013	19	7½
4706	11	11½	47806	11	10½	407	11	2
16	5	9½	110	15	6½	19	9	10½
9001	9	8½	4006	19	11½	7	6	5½
5	14	4½	7	1	2	365	14	10½
609	17	6½	406	10	11½	980047	10	5
584763	10	11½	18	8	9½	109	9	7½
14	0	6½	1002	7	5½	27006	18	11½
67396	17	8	19	7	6	397	15	6
214	9	6½	5	14	10½	43	12	9½
10	12	10½	367	13	5½	3706	17	5½

(7)			(8)			(9)		
£	s.	d.	£	s.	d.	£	s.	d.
10	17	9½	7863	10	7½	201	13	4½
2067	14	10½	47	9	8½	4076	11	7½
865	1	5½	630	12	7	31	9	4½
10207	14	10½	1	9	8½	108	12	11½
1	8	1½	36	17	5	96	14	7
308	19	11½	47984	15	6½	27306	17	10½
0	17	8	101	16	7½	4	0	7½
13	4	6½	2709	9	8½	917	11	5
8706	13	10	12	2	6	29	13	10½
47360	9	8½	436	18	8½	4730	5	11½
67	11	7½	7069	3	3½	69409	17	5
4063	5	8½	17	15	9½	103	8	10½
976	13	5	4764	9	7	49	11	6
43	8	4½	17	5	6½	796	15	10½
9	12	5½	896	14	11½	16	17	9½

(10)			(11)			(12)		
£	s.	d.	£	s.	d.	£	s.	d.
21	14	6½	302	17	5½	2798	14	1
1002	9	7	1	8	6½	79	10	11½
476	19	11½	40079	19	10	406	5	8½
308	5	10½	183	5	11½	1	17	10
17	16	9	10	14	1½	36	14	9½
4079	13	7½	3906	9	8	38943	15	4
868	10	11½	47	1	5½	1001	3	9½
53201	19	8½	27430	10	11½	365	19	7½
4	11	7½	916	4	7½	47	5	11
4063	7	8½	29	18	6	97413	17	5½
79607	14	10	1435	6	7	406	15	10½
33	8	11½	219	17	11½	4917	11	6
3675	18	7	27	16	5	473	10	11½
209	10	11½	9	17	10½	69	7	10
3	4	7½	4786	15	7	4314	15	7½

(13)

£	s.	d.
409	7	6½
8078	19	8
47	16	5½
9816	7	4
0	18	0¾
709	13	10
4814	11	6½
5	0	6¾
169	14	11½
75406	18	1
4013	4	10½
768	15	9½
11	6	7½
9473	15	8
567	10	5½

(14)

£	s.	d.
1	18	10½
407	10	6
19	8	5½
5063	11	8
24	9	6½
479	18	11½
83	19	9½
7138	4	10
101	1	7
54013	19	9½
786	14	11
89	7	10½
378	15	9
46	4	10½
1	19	7

(15)

£	s.	d.
8410	10	11
1	9	8½
306	17	5½
17	8	4½
10	11	5½
378	6	9
4009	18	7½
190	6	5½
13	10	4
58017	7	6½
389	15	8½
4001	11	6½
564	9	7
367	5	10½
3973	11	6½

(16)

£	s.	d.
86	19	8½
415	5	9½
6007	18	11
22	6	5½
314	9	8½
407	18	6½
29815	11	10
4013	9	8½
2	6	7
209	18	10½
75410	11	7½
817	15	6
1	19	5½
4006	7	10
297	16	5½

(17)

£	s.	d.
13	19	10½
406	17	8½
3987	1	5½
10	15	8
163	6	7½
6073	14	8½
1	10	11½
89	5	9½
164	11	8½
1	8	6
57936	14	10
410	15	9½
9826	13	10
1	17	6
504	9	8½

(18)

£	s.	d.
7846	19	8½
29	17	10
463	9	7½
120	10	11½
6	19	7½
1	5	9
47	18	10½
37469	5	8
501	10	8½
4079	18	11½
24	9	8
1010	10	9½
407	15	6
16	9	9½
100	17	5½

(19)			(20)			(21)		
£	s.	d.	£	s.	d.	£	s.	d.
1	18	11½	417	1	6	8963	15	10½
17	4	9	29	18	10½	0	17	6
2007	17	5½	5	4	9½	101	5	9½
0	16	9½	20010	17	2½	47	11	11½
10	14	5	12	5	9	9	8	2½
869	18	7½	878	13	10½	468	15	9
4	15	10	4004	6	7½	27	13	11½
47913	8	7	894	12	5	57013	9	8
56	11	10½	47006	16	11½	365	10	10½
708	5	7½	4719	8	2½	49	8	11½
8004	17	1½	28	18	5	4016	16	8
98	6	11½	50417	17	10½	78	13	10½
701	15	10	1092	9	7	491	5	9½
47	16	9½	16	7	10½	67	13	10
379	9	5	4069	18	5½	3090	15	9½

(22)			(23)			(24)		
£	s.	d.	£	s.	d.	£	s.	d.
29	18	5	9864	10	1½	176	11	10
147	13	11½	1	1	10½	2004	9	8½
4016	7	8½	201	13	7	73	15	11½
13	19	10	1010	4	6½	694	7	8½
147	5	11½	15	17	8½	9	15	6½
869	14	2	704	11	6½	4780	14	10
41	9	10½	49	16	10	29	11	6½
1001	10	5½	57850	15	9½	365	4	1
67	12	6	10	11	7½	57843	13	10½
149	8	4½	147	14	2	101	16	5
1	5	11½	3003	6	7½	2047	3	9½
17	6	1	207	19	8½	58	18	10½
4986	5	11½	19	9	6½	79	14	7
47	10	5	1	5	11½	106	7	9½
584	15	6½	306	18	1	49	18	5

CIVIL SERVICE ADDITION

	£	s.	d.
1.	7,896,473	18	10
	406,909	17	6
	384,756	19	11
	8,493,294	18	10
	5,407,658	0	5
	1,493,256	11	7
	7,806,497	5	11
	357,609	12	2
	6,009,436	4	8
	7,430,698	15	9
	365,407	14	10
	5,493,265	18	2
	35,470	5	4
	9,806,703	13	7
	4,437,296	8	1
	784,309	19	9
	6,030,040	3	11
	785,638	11	10
	5,506,380	17	7
	9,375,016	8	8

	£	s.	d.
2.	578,294	13	5
	6,493,209	18	11
	47,246	11	4
	568,294	9	9
	7,090,647	5	10
	9,846,734	15	4
	540,309	18	6
	73,209	11	10
	1,106,317	15	2
	5,432,327	10	11
	3,006,409	5	8
	475,373	13	9
	6,704,111	12	10
	750,407	17	1
	39,286	5	5
	4,114,319	19	3
	316,218	15	9
	7,109,263	8	8
	463,975	10	11
	9,016,324	9	8

	£	s.	d.
3.	4,732,946	13	11
	804,379	15	9
	9,313,261	8	1
	4,172,530	4	6
	35,479	7	10
	476,318	11	7
	17,296	12	2
	3,176,593	18	11
	14,270	10	5
	17,265	8	9
	5,190,217	13	4
	69,318	15	10
	970,615	11	6
	7,006,327	18	9
	47,365	5	4
	193,209	6	11
	6,020,473	11	6
	9,836,759	14	10
	27,413	8	6
	356,709	11	4

	£	s.	d.
4.	356,473	18	10
	47,209	7	5
	4,067,378	5	9
	976,434	11	7
	5,406,790	8	10
	37,209	15	4
	48,367	13	7
	4,069,358	15	11
	3,756,287	13	10
	47,459	16	7
	365,473	10	5
	49,360	8	1
	7,506,473	5	3
	978,406	4	4
	35,035	7	11
	8,674,298	16	9
	47,047	7	7
	5,406,293	10	11
	375,046	9	8
	4,759,417	17	10

	\$	n.	d.
5.	4,906,275	13	9
	73,467	9	5
	57,609	11	10
	4,309,010	5	4
	875,463	3	8
	754,389	9	9
	9,874,563	10	10
	7,546,389	18	1
	917,865	5	5
	49,887	16	9
	8,705,360	9	8
	4,543,296	18	11
	37,468	4	5
	754,389	10	6
	863,295	14	9
	5,907,709	3	7
	474,376	8	5
	37,584	11	10
	6,730,407	10	1
	9,004,313	8	8

	\$	n.	d.
6.	7,430,694	11	10
	47,365	4	6
	594,274	10	5
	6,932,469	8	9
	47,498	9	6
	35,617	16	7
	3,015,406	7	11
	47,369	18	8
	8,406,217	15	10
	478,869	11	5
	376,298	6	11
	9,845,714	9	4
	14,216	15	10
	7,894	6	9
	5,436,219	13	8
	4,749,365	18	10
	7,815	5	5
	436,208	14	9
	5,806,317	7	11
	47,601	1	10

	\$	n.	d.
7.	57,698	18	6
	7,804,819	16	9
	7,846	11	10
	756,409	13	11
	8,109,213	4	7
	75,409	6	9
	814,273	9	8
	6,947,365	14	10
	70,617	19	6
	4,764,311	11	11
	8,904	6	6
	754,403	4	8
	8,090,515	15	8
	3,704,619	9	11
	476,008	18	3
	75,493	6	6
	8,967	17	8
	5,146,834	11	10
	67,494	4	2
	756,898	18	1

	\$	n.	d.
8.	6,009,017	16	11
	470,619	9	6
	8,947	13	2
	7,135,419	6	9
	478,524	17	5
	97,417	16	10
	514,613	3	1
	8,743,215	14	2
	9,816	7	11
	5,406,328	10	10
	678,543	6	6
	3,109,070	17	8
	476,529	8	5
	887,414	10	11
	78,516	18	10
	9,864,327	16	9
	756,418	17	10
	8,947	6	11
	5,416,019	19	1
	78,436	4	5

	£	s.	d.
9.	5,804,639	16	10
	78,608	7	5
	4,963	11	6
	753,874	9	8
	37,639	15	11
	6,973,294	7	10
	870,906	15	5
	75,439	17	8
	8,967,483	6	1
	473,292	12	2
	754,019	6	10
	4,733	9	5
	6,753,294	18	9
	75,463	13	11
	8,409,706	9	8
	756,413	12	7
	54,629	9	10
	875,418	10	6
	5,014,017	7	7
	386,524	15	11

	£	s.	d.
10.	58,319	8	10
	7,416,724	14	9
	389,417	18	6
	7,894	9	5
	8,315,693	11	11
	784,316	10	5
	9,830	13	8
	4,171,411	9	10
	67,819	17	7
	543,218	19	11
	9,760,049	8	1
	84,713	16	9
	1,703,214	15	10
	674,825	11	1
	97,640	5	5
	785,329	8	9
	67,345	4	11
	5,417,386	19	10
	478,829	6	3
	8,007,418	18	8

	£	s.	d.
11.	7,416,375	18	10
	4,309,619	7	11
	785,436	15	9
	354,693	8	6
	47,242	12	10
	7,470,318	8	6
	593,617	14	4
	78,410	11	11
	6,733,519	18	1
	58,413	6	9
	784,916	10	8
	8,417	7	5
	8,673,294	4	10
	7,306,915	18	9
	87,416	7	7
	586,317	15	11
	4,811	6	11
	9,013,047	7	10
	875,463	16	6
	49,519	9	2

	£	s.	d.
12.	785,049	9	6
	47,813	16	1
	6,324,212	12	2
	3,146,247	15	4
	785,319	18	16
	9,133,567	11	6
	896,314	5	8
	7,153,067	7	10
	896,218	19	5
	8,047	5	11
	9,305,463	18	6
	784,039	12	2
	8,976	4	7
	5,413,292	8	11
	87,433	13	6
	986,414	8	5
	7,515,729	11	8
	4,306,215	5	7
	984,765	14	9
	78,417	7	11

	£	s.	d.
13.	8,947	12	6
	5,476,315	8	1
	850,419	9	10
	75,318	16	8
	4,913,453	16	7
	75,427	3	8
	8,929	15	11
	640,413	7	5
	98,595	14	10
	7,423,324	12	8
	986,719	18	1
	5,420,706	6	9
	874,329	8	11
	8,417	17	6
	384,523	16	10
	471,130	8	6
	8,749	11	11
	8,414,327	7	5
	87,415	12	8
	7,426,326	6	6

	£	s.	d.
14.	765,432	18	10
	8,940,819	6	1
	58,224	10	11
	783,118	5	5
	6,947	13	10
	731,096	6	5
	5,980,418	15	9
	73,246	9	8
	759,315	5	1
	8,294	11	11
	396,417	6	2
	3,245,047	13	5
	69,918	19	10
	743,215	8	1
	5,422,477	17	7
	6,313,294	8	5
	2,047,047	12	2
	693,259	11	10
	75,439	10	5
	1,314,217	7	4

	£	s.	d.
15.	5,276,389	13	4
	27,894	6	3
	629,704	18	10
	4,304,017	16	5
	9,136	10	11
	49,856	12	10
	7,834,639	16	3
	246,783	18	9
	9,584,607	17	10
	365,908	10	5
	63,508	11	6
	849,783	8	1
	6,789,420	16	8
	57,384	12	3
	8,986,742	11	11
	786,306	15	2
	64,908	10	4
	369,750	13	9
	2,005,074	18	7
	578,384	19	11

	£	s.	d.
16.	7,839,742	13	10
	856,092	18	5
	2,830,956	11	10
	57,836	6	1
	289,754	12	8
	9,827,632	11	5
	244,786	16	4
	29,832	12	6
	583,629	15	9
	3,752,842	18	7
	4,027,092	17	4
	283,749	12	11
	8,342	18	10
	78,356	13	9
	475,827	16	8
	7,846,983	14	11
	86,940	16	2
	9,582,649	19	7
	27,853	18	5
	2,378,954	14	10

	£	s.	d.
17.	87,349	16	3
	5,248,784	17	10
	659,889	11	11
	8,973,642	12	9
	4,207,308	18	10
	53,749	12	8
	9,578,865	15	9
	47,384	14	6
	2,365,407	17	10
	97,384	15	10
	246,889	19	8
	7,507,340	2	1
	649,856	11	10
	283,374	14	3
	689,858	18	11
	4,368,742	12	8
	5,786,327	17	5
	7,386	2	4
	83,749	19	5
	6,378,422	12	1

	£	s.	d.
18.	5,874,286	16	4
	3,423,804	14	10
	249,742	8	5
	867,384	14	11
	75,632	15	10
	9,372,865	4	5
	368,927	12	11
	29,078	18	2
	678,982	4	9
	5,827,892	16	8
	128,930	14	1
	89,276	16	7
	2,987	19	9
	898,762	2	1
	3,927,893	10	10
	692,708	8	9
	5,893,786	18	2
	429,047	17	11
	4,289,368	19	10
	3,769,823	15	2

	£	s.	d.
19.	4,276,398	11	10
	408,249	19	7
	87,802	18	11
	694,986	2	4
	7,097,820	15	8
	304,278	18	9
	537,821	11	10
	3,402,376	16	1
	937,244	14	7
	2,062,007	17	5
	300,976	2	4
	98,763	18	7
	8,873,329	11	10
	246,674	1	2
	3,365,540	18	11
	4,386,024	14	9
	5,276,342	18	6
	974,427	16	9
	3,003,004	14	6
	247,886	12	11

	£	s.	d.
20.	5,887,286	15	10
	374,420	18	9
	87,848	16	11
	9,578,424	11	6
	329,846	17	4
	2,586,653	18	1
	58,702	2	8
	5,283,341	10	11
	91,865	19	10
	4,247,486	17	2
	365,284	10	5
	9,876,425	15	10
	964,207	5	7
	1,346,678	6	8
	987,749	19	11
	5,005,007	2	1
	364,280	18	9
	76,649	11	10
	4,067,864	15	8
	2,378,974	14	8

	\$	s.	d.
21.	7,836,324	15	10
	346,789	11	4
	2,508,326	16	8
	946,369	19	11
	5,786	2	1
	49,478	13	4
	249,783	15	9
	5,057,086	16	10
	9,094,075	11	8
	365,764	14	6
	8,378,246	18	11
	387,048	11	3
	582,013	10	1
	2,286,286	16	4
	9,327,895	13	9
	5,809,327	17	10
	789,420	12	11
	4,203,867	15	8
	1,386,782	5	1
	893,274	7	10

	\$	s.	d.
22.	2,178,369	13	10
	9,786,420	12	1
	78,569	19	11
	246,386	10	4
	1,342,692	2	3
	769,840	8	9
	4,027,086	16	10
	429,368	18	5
	27,869	11	3
	5,276,301	1	2
	9,803,869	10	5
	2,013,896	17	8
	209,369	12	10
	38,256	16	8
	927,893	13	11
	5,809,394	9	6
	708,923	10	10
	789,254	17	5
	29,872	13	3
	8,678,237	17	4

	\$	s.	d.
23.	6,298,729	13	10
	9,329,857	17	6
	982,976	11	9
	2,093,284	14	1
	302,793	19	11
	9,893,279	18	7
	365,486	16	11
	95,364	14	1
	2,576,890	10	10
	1,342,307	17	9
	890,326	18	4
	9,307,824	13	7
	708,326	16	10
	5,907,832	12	4
	253,969	19	11
	1,382,762	4	5
	398,244	7	8
	478,677	10	9
	9,236,924	14	2
	5,209,369	13	3

	\$	s.	d.
24.	678,927	14	6
	3,205,836	15	11
	4,392,326	10	4
	933,789	7	2
	4,322,072	9	9
	35,206	13	10
	792,869	10	3
	2,398,726	19	11
	590,270	13	3
	9,324,568	4	10
	629,823	13	4
	7,892,062	12	6
	8,932,705	16	8
	927,038	18	11
	75,893	13	3
	293,809	19	10
	75,892	4	8
	9,368,954	7	4
	3,293,806	9	7
	609,283	13	5

	£	s.	d.
25.	7,429,365	18	7
	386,419	7	10
	1,165,327	11	6
	4,813	10	1
	785,468	8	5
	4,119,217	5	10
	280,324	17	5
	9,899	9	8
	5,423,223	15	10
	786,417	7	11
	85,222	12	2
	7,314,416	8	1
	523,712	16	9
	87,427	6	5
	9,273,546	8	10
	546,375	10	4
	1,005,407	14	11
	98,068	5	2
	784,390	9	7
	71,106	19	8

	£	s.	d.
26.	498,763	15	9
	7,114,287	10	6
	74,139	6	9
	549,817	17	10
	6,714	3	7
	4,275,423	16	11
	87,536	7	5
	8,724,368	12	4
	204,708	19	10
	2,378,594	14	3
	989,276	13	1
	3,908,726	12	11
	893,782	13	6
	5,983,476	16	2
	589,286	5	8
	7,893	2	6
	50,876	19	10
	428,374	14	3
	7,809,386	12	7
	408,367	17	9

	£	s.	d.
27.	8,093,244	16	10
	903,786	11	11
	98,562	12	3
	289,302	6	4
	1,329,498	7	9
	428,921	17	8
	4,398,286	5	2
	5,809,326	4	7
	48,374	15	11
	930,760	16	10
	2,038,932	11	4
	780,927	8	6
	4,028,675	15	10
	983,867	14	11
	28,093	16	9
	5,253,786	8	5
	987,604	11	2
	58,366	2	1
	1,113,214	19	11
	8,008,017	17	4

	£	s.	d.
28.	3,209,367	16	10
	980,113	10	9
	4,021,389	19	11
	589,423	11	6
	3,792,746	6	8
	325,629	7	5
	98,032	13	3
	246,368	9	10
	9,832,739	18	4
	368,246	12	7
	1,347,892	8	11
	7,203,278	19	7
	589,327	17	5
	8,932,749	13	4
	893,013	6	10
	1,389,275	11	11
	502,863	4	8
	87,324	13	9
	923,675	15	1
	4,209,306	16	8

SEPARATE ADDITION (to be added across the page).

1.	57046	82569	864	47325	5420	9	74937	3482	547	89678
2.	8679	346	24670	59	73478	6478	429	54765	6376	7
3.	28	6597	342	97543	3695	78254	6592	47	78659	426
4.	347	19	57659	2483	78	9346	42786	379	4	54672
5.	92765	427	3465	29768	4527	17	659	38654	2748	1739
6.	257	68569	29	4897	63864	73469	6	237	64865	576
7.	4675	320	76542	8	4739	23	78429	6549	653	86327
8.	7	4627	368	59472	73456	4736	54	17365	8239	769
9.	382	82763	4759	6	745	76821	4636	29	573	7354
10.	56739	667	11	5734	94397	9	679	5483	37658	49
11.	267	4839	98627	7	285	8377	75936	77	5469	43586
12.	4735	69765	473	64376	79	3	35	7369	27	349
13.	7	356	7659	684	6548	17356	8569	52	91653	7865
14.	76549	5	72	1562	73869	3475	478	38093	742	57
15.	378	6548	78549	52	765	7	53869	75	64329	738
16.	3682	739	562	76329	4837	359	7	565	7386	52576
17.	86	58346	4635	7	559	95876	4739	6339	59	346
18.	65473	37	67365	736	7863	4	63867	23697	48657	79
19.	7657	679	65	66472	17	4769	472	5	7364	89567
20.	5	76937	357	7659	73569	437	3582	28	76375	378

About a dozen of the above, with six exercises as on pp. 104-119, given at all Examinations for Class II. Time, half-hour.

ANSWERS.

ELEMENTARY.—SET 1.

- (1) 1,238 miles, 3 furlongs, 2 perches, 4 yards, 0 feet, 7 inches.
 (2) 6 quarters, 5 bushels, 3 pecks. (3) 1,898 acres, 3 roods, 20 perches. (4) 12 lbs., 2 oz., 14 dwts., 16 grs. (5) $14\frac{11}{16}$. (6) $1\frac{1}{2}$. (7) $11\frac{1}{2}$. (8) $3\frac{1}{2}$. (9) 47·7366. (10) 3·024. (11) ·007120988.
 (12) ·40617. (13) $\frac{3}{4}$. (14) ·684375. (15) £6 8s. 0d. (16) £899 3s. 4d. (17) £43 12s. 9 $\frac{1}{2}$ d. (18) 18. (19) £449 0s. 3 $\frac{1}{2}$ d. (20) £641 2s. 5d. (21) £631 6s. 9 $\frac{1}{2}$ d. (22) 2 $\frac{1}{2}$ years. (23) 15s. 6 $\frac{1}{2}$ d. (24) 87422 $\frac{1}{2}$. (25) 1,015 cubic yards, 23 feet, 900 inches. (26) 13 $\frac{1}{2}$. (27) $8\frac{1}{2}$. (28) $86\frac{1}{2}$. (29) 2 $\frac{1}{4}$. (30) $\frac{1}{2}$.
 (31) 54·197674. (32) 94·294. (33) 289·00152. (34) ·6104477. (35) ·203125. (36) 2 roods, 8 perches, 20 yards, 7 feet, 104 inches. (37) £1 5s. 11d. (38) ·07125. (39) 6·i.

SET 2

- (1) 264 tons, 6 cwt., 1 qr., 20 lbs., 4 oz. (2) 340312 $\frac{1}{2}$. (3) 3,066 loads, 1 quarter, 2 bushels, 2 pecks, 1 gallon, 1 quart, 1 pint. (4) £4 8s. 2 $\frac{1}{2}$ d. (5) 9 days. (6) 18 $\frac{1}{16}$. (7) $7\frac{1}{2}$. (8) 99 $\frac{3}{4}$. (9) $4\frac{1}{2}$. (10) £59 7s. 4 $\frac{1}{2}$ d. (11) £656 11s. 6 $\frac{1}{2}$ d. (12) £4 2s. 6d. (13) $3\frac{1}{2}$. (14) 381·00983. (15) ·89988. (16) ·1581558.
 (17) 442·3846. (18) $\frac{1}{16}$. (19) ·625. (20) 4 years, 14 weeks, 5 days. (21) £2 9s. 0d. (22) £1 2s. 9d. (23) 15s 11 $\frac{1}{2}$ d. (24) 32. (25) 48. (26) 5 days. (27) 20 $\frac{1}{2}$. (28) 5 $\frac{1}{2}$. (29) 58 $\frac{1}{2}$. (30) 15. (31) $\frac{1}{2}$. (32) ·4536. (33) 1193·54069. (34) 2·91294. (35) 88·693544. (36) ·3454. (37) £1 5s. 10 $\frac{1}{2}$ d. (38) £16 17s. 4 $\frac{1}{2}$ d. (39) £1,900 12s. 2 $\frac{1}{2}$ d.

SET 3.

- (1) .00713. (2) .07. (3) £58,736 18s. 3½d. (4) £627,412 7s. 2½d. (5) 4 acres 2 roods 28½ perches. (6) £154 7s. 3½d. (7) 122 lbs., 3 oz. 6 dwts. 2 grains. (8) 9½. (9) £10,970 9s. 3½d. (10) £1,145 3s. 6½d. (11) 43 miles, 2 furlongs, 33 perches, 3 yards, 1 foot, 10 inches. (12). 20 pence. (13) 17½. (14) 8½. (15) 9½. (16) 3½. (17) ½. (18) 22·704694. (19) 1·363752. (20) 199·833672. (21) 2350·3364. (22) 56 acres 0 roods 16 perches. (23) £74 8s. 4½d. (24) 4 per cent. (25) £568 6s. 5d. (26) £20,836 17s. 5d. (27) 16 acres. (28) £325. (29) 50½. (30) 5½. (31) 14½. (32) 8½. (33) ½. (34) 7½. (35) 603·9351659. (36) 52·639726. (37) 11·593111248. (38) .0963. (39) 3 acres 0 roods 22 perches.

SET 4.

- (1) 8 acres, 2 roods, 35 perches, 4 yards, 0 feet, 20 inches. (2) 33456. (3) £72 15s. 4d. (4) 9 cwt., 2 qrs., 17½ lbs. (5) 1 ton, 19 cwt., 3 qrs., 12 lbs. (6) 432 and 2862. (7) £106 15s. 0½d. (8) 7½. (9) 4½. (10) 12. (11) ½. (12) ½. (13) 767·546013. (14) 1·557021. (15) 2·180923. (16) 11888·8. (17) .1623. (18) £2 4s. 0½d. (19) 20. (20) £41 8s. 4d. (21) 18. (22) £385 17s. 11·01d. (23) £300. (24) 7½. (25) £46 16s. 0d. (26) £6366 11s. 0½d. (27) 23½. (28) 6½. (29) 4½. (30) 1½. (31) 2 roods, 10½ perches. (32) ½ least, ½ greatest. (33) ½. (34) 8·12507. (35) 9·36. (36) .2569. (37) 99·1957. (38) 19s. 3d. (39) 1 oz., 9 dwts., 2 grains.

SET 5.

- (1) 381452½. (2) 27540 loads, 3 qrs., 5 bushels, 3 pecks, 1 gallon, 3 quarts, 1 pint. (3) 162 lbs., 10 ozs., 4 dwts., 9 grains. (4) 10 tons, 0 cwt., 2 qrs., 9½ lbs. (5) £199 18s. 4½d. (6) £325. (7) £166 8s. 8½d. (8) £1 17s. 6d. (9) 2½ years. (10) 510. (11) 24. (12) 25½. (13) 2½. (14) 13½. (15) 1½. (16) £74 6s. 4½d. (17) 19. (18) £30230 1s. 6d. (19) £2255 17s. 4½d. (20) 3277-84413. (21) 8-2703. (22) 3-02968836. (23) 1687-301. (24) .04. (25) 1-5789. (26) £11 12s. 0d. (27) 4½. (28) ½. (29) 1. (30) ½. (31) 10 ozs. (32) £6 16s. 0d. (33) £7 10s. 5½d. (34) 11½ days. (35) £3 18s. 9d. (36) 710-13067. (37) 2-53313. (38) 1-8725. (39) 3-69.

SET 6.

- (1) 18142 leagues, 0 miles, 1 furlong, 25 perches. (2) £188 16s. 1-44d. (3) £0 14s. 3d. (4) 39742. (5) £19 5s. 8½d. (6) £8389 4s. 6d. (7) 21½ days. (8) £1482 1s. 6d. (9) 4. (10) £23 9s. 4d. (11) 22½. (12) 9½. (13) 15½. (14) 1½. (15) ½. (16) ½ (17) £9 0s. 0d. (18) 17 feet 3 inches. (19) 1 acre, 1 rood, 0 perches, 4 yards, 6 feet, 86 inches. (20) 79290. (21) 79-9511046. (22) 2-64021 (23) .02535728. (24) 17575-675 (25) .3416. (26) £67 15s. 10½d. (27) £400. (28) 27 acres, 1 rood, 27 perches. (29) £34 9s. 7½. (30) £17 10s. .d. to one and £14 to each of four. (31) 2½. (32) ½. (33) ½. (34) ½. (35) ½. (36) 580. (37) 511039 fathoms, 4 feet, 11 inches. (38) 459870. (39) 16.

SET 7.

- (1) .048486. (2) 2-509 (3) £47 0s. 2d. (4) £357 17s. 1d. (5) £3 2s. 0d. (6) 32 days. (7) £11 17s. 10½. (8) 35002. (9) 14967 loads, 3 quarters, 1 bushel, 1 peck, 1 gallon. (10) 8000. (11) 10 feet. (12) 40 lbs., 2 ozs., 2 drams. (13) 1 ton,

SET 7—Continued.

5 cwt., 3 qrs. (14) 2862. (15) $9\frac{1}{2}$. (16) $2\frac{1}{2}$. (17) $3\frac{1}{2}$. (18) £65 13s. $0\frac{1}{2}$ d. (19) 12 cwt. 2 qrs. $1\frac{1}{2}$ lbs. (20) $\frac{1}{2}$. (21) $8\frac{1}{2}$. (22) £39 17s. 6d. (23) £5,389 10s. $7\frac{1}{2}$ d. (24) £397 15s. 0d. (25) £94 19s. 0d. (26) £200. (27) 4. (28) $8\frac{1}{2}$. (29) $2\frac{1}{2}$. (30) $2\frac{1}{2}$. (31) The shares are to each of three £3 12s. 0d., to the other two £3 18s. 1d., and £3 17s. 6d. (32) 201·75344 (33) 99·7051. (34) 19·71. (35) ·01. (36) 1 ton, 0 cwt., 2 qrs., $1\frac{1}{2}$ lbs. (37) $\frac{2}{3}$. (38) 6 lbs., 9 ozs., 2 dwts., 19 grains. (39) £2 18s. 0d.

SET 8.

(1) $62\frac{1}{2}$. (2) $5\frac{1}{2}$. (3) $35\frac{1}{2}$. (4) 18. (5) $\frac{1}{2}$. (6) $\frac{1}{2}$. (7) 557·5479369. (8) 183·334203. (9) ·0599002434. (10) ·01153. (11) 1·6. (12) £48 17s. 11d. (13) 17 acres, 23 perches, 22 yards, 4 feet, 36 inches. (14) 121,360. (15) 17476 ells, 1 qr., 2 nails, $1\frac{1}{2}$ inches. (16) £61 3s. $4\frac{1}{2}$. (17) £14 7s. 6d. (18) $39\frac{1}{2}$. (19) $7\frac{1}{2}$. (20) 35. (21) 246. (22) $\frac{1}{2}$. (23) 1295·105417. (24) 52·994941. (25) 8·0676492. (26) ·07313. (27) 128 yards. (28) £373 13s. 0d. (29) £429 12s. $6\frac{1}{2}$ d. (30) £5,417 17s. 0d. (31) 4 years. (32) £567 10s. 0d. (33) $3\frac{1}{2}$. (34) $1\frac{1}{2}$. (35) $\frac{1}{2}$. (36) $2\frac{1}{2}$. (37) £1523 13s. 0d. (38) 28 yards. (39) £73 10s. 0d.

SET 9.

(1) 1419 miles 6 furlongs 6 perches 2 yards. (2) 45715. (3) £1 16s. $9\frac{1}{2}$ d. (4) £13,168 9s. $6\frac{1}{2}$ d. (5) 83 weeks, 6 days, 6 hours, 21 minutes, 18 seconds. (6) £16 13s. 4d. (7) £510. (8) 39 acres, 0 roods, 19 perches, 4 yards, 7 feet, 36 inches. (9) 32. (10) £135 2s. $0\frac{1}{2}$ d. (11) £2,176. (12) £5,184 4s. $6\frac{1}{2}$ d. (13) $1\frac{1}{2}$. (14) $3\frac{1}{2}$. (15) $124\frac{1}{2}$. (16) $8\frac{1}{2}$. (17) $8\frac{1}{2}$. (18) 5 acres, 1 rood, $11\frac{1}{2}$ perches. (19) 24. (20) £159 10s. 0d. (21) 563·830956. (22) 2·9964. (23) ·644022. (24) ·07. (25) 12s. $2\frac{1}{2}$ d.

SET 9.—Continued.

(26) £309 9s. 9d. (27) 1282 acres, 3 roods, 32 perches. (28) 1 lb., 7 oz., 13 dwts., 14 grains. (29) 11 years, 16 weeks, 6 days. (30) 2 tons 2 cwt. 2 qrs. 14 lbs. (31) £1059 2s. 8½d. nearly. (32) £559 13s. 3d. (33) £450. (34) 6 years. (35) £159 6s. 2½d. (36) 18½½. (37) 2½½. (38) .08½. (39) .11.

SET 10.

(1) 27 tons, 9 cwt., 3 qrs., 21 lbs., 8 ozs. (2) £125 18s. 9½d (3) £4450 15s. 2½d. (4) 878 tons, 17 cwt., 2 qrs. (5) 390 loads, 2 qrs., 4 bushels, 5 pinta. (6) £43 13s. 10d. (7) 36080640. (8) 9½½. (9) 1½½. (10) 86½½. (11) ½½. (12) 4898·809187. (13) 8·99994. (14) 1·029457848. (15) ·09902. (16) ⅙. (17) 18800 and 10s. (18) 3½ years. (19) £42 5s. 0d. (20) 1241 feet. (21) ·046875. (22) 23½½. (23) 1½½. (24) 82½½. (25) ⅙. (26) ⅙. (27) 158·192184. (28) 199·92781. (29) ·83. (30) £328 0s. 11d. (31) 3 acres, 1 rood, 32 perches. (32) £6,963 15s. 9½½d. (33) £7 12s. 2d. (34) £45 15s. 9d. (35) 40. (36) £1065 15s. 5·85d. (37) £3872 16s. 3·78d. (38) £863 11s. 0d. (39) £716 11s. 10½d. nearly.

SET 11.

(1) ·1656. (2) 90. (3) 3·80698921145. (4) 14 hours 14·72 minutes. (5) 1044 yards, 1 foot, 3·3 inches. (6) 2½. (7) 2½½. (8) 6½ years. (9) £118 9s. 5½d. (10) £225. (11) 40,785,120. (12) ·3125. (13) 8304. (14) ·46317535445. (15) 636·25797. (16) 174·467958. (17) ½½. (18) 108. (19) 1½½. (20) 17½. (21) £4,803 14s. 6d. (22) £10829. (23) 21 cwt., 3 qrs., 14 lbs. (24) 1688 qrs., 1 peck, 3 pinta. (25) ·01996 &c. (26) 26 tons, 19 cwt., 3 qrs., 15 lbs., 15 ozs. (27) 113 yards. (28) £246 15s. 3½d. (29) £802 16s. 9d. (30) £32 18s. 1½d. (31) £350. (32) 238 ozs., 4 dwts. (33) 1 acre 5 perches. (34) 80 tons, 17 cwt., 3 qrs., 3 lbs., 15 ozs. (35) 10 men. (36) 20½½. (37) 1½½. (38) 5½½. (39) 6.

SET 12.

(1) £8,844 1s. 7½d. (2) £977 5s. 4·8d. (3) 6 weeks. (4) £20 9s. 6d. (5) £63 0s. 3½d. (6) £650 15s. 3¼d. (7) 65 loads, 4 quarters, 4 bushels, 2 pecks, 6 pints. (8) 7650. (9) £47 0s. 5d. (10) 12 days, 1 hour. (11) 5868. (12) 5½. (13) 25. (14) 8½. (15) ½. (16) 14. (17) ⅔. (18) 720·8881347. (19) 1·8999997. (20) 5828·41581. (21) 128·248. (22) 3 roods, 30 perches. (23) ·4375. (24) £577 9s. 0⅞. (25) 276. (26) ·75. (27) £23 15s. 3¼d. (28) £11 8s. 11½d. (29) 401 lbs. 9 ozs. 8 dwts., 6 grains. (30) 7 cwt. 2 qrs. (31) 29⅞. (32) 7½. (33) 3. (34) 1½. (35) ⅔. (36) 175·73737. (37) 96·493943. (38) ·12741. (39) 92330.

SET 13.

(1) £15 17s. 6d. (2) £471 16s. 4·8d. (3) £195 19s. 4⅞d. (4) 201472. (5) £14 6s. 0d. (6) 4 years. (7) 200 days. (8) £63,081 18s. 11½d. (9) 7 acres, 2 roods, 16 perches, 20 yards, 3 feet, 53 inches. (10) 26⅞. (11) 2½. (12) 1½. (13) 4. (14) ⅞. (15) 4 acres, 2 roods, 20½ perches. (16) 1750·62734. (17) 5·96411. (18) 37·01048. (19) ·01017303 &c. (20) 0·6890625. (21) 1,096 fathoms, 2 feet, 10 inches. (22) £171 0s. 1d. (23), £1,387 7s. 4½d. (24) 162 cwt. (25) 21 tons, 7 cwt. 0 qrs., 9 lbs. 15 ozs. (26) 199875. (27) 80 weeks 5 days 8 hours. (28) £251 15s. 4d. (29) £577,500. (30) 32½. (31) 82⅞. (32) 2½. (33) 44½. (34) 27½. (35) 6312·786697. (36) 187·589791. (37) 1·887227901. (38) 5·1975. (39) ·4.

SET 14.

(1) 26 tons, 6 cwt., 2 qrs., 12 lbs., 14 ozs. (2) 8 tons, 2 cwt. (3) £3,933 1s. 1½d. (4) £226 13s 1d. (5) 19⅞. (6) 5½. (7) 116½. (8) ⅔. (9) 107·2567. (10) 24·2963. (11) 669·46502. (12) ·14948. (13) 21164. (14) 32 weeks, 1 day, 23 hours, 31 minutes, 51 seconds. (15) 5½ lbs. (16) £122 5s. 4½d. (17) £328. (18) £1 15s. 1d. (19) £353 9s. 9⅞. (20) 16½ years.

SET 14—Continued.

- (21) 6 per cent. (22) 8 years. (23) 1·171875. (24) 12s. 9·72d.
 (25) 2·15 days. (26) ·000227624. (27) ·23019. (28) ·60625.
 (29) 15 cubic yards, 2 feet, 172 inches. (30) £1 5s. 1½d. (31)
 112 men. (32) £40. (33) 12½. (34) 4½. (35) 116½. (36)
 8½. (37) ½. (38) ⅓ greatest, and ⅓ least. (39) ⅓.
-

SET 15.

- (1) £967 5s. 10d. (2) £449 11s. 6½d. (3) £11 14s. 0½d.
 (4) 136 lbs., 4 ozs., 9 dwts. (5) 2839½. (6) 7½d. (7) 307 tons,
 9 cwt., 1 qr., 24 lbs. (8) 3 bushels, 3 gallons, 5 pints. (9) 6
 days. (10) 4½ years. (11) £53 9s. 5½d. (12) £20 1s. 7½d.
 (13) 27½. (14) 9½. (15) 4½. (16) 11½. (17) ⅓. (18)
 £117 11s. 3½. (19) 804·418. (20) 13·5394. (21) 155·805918.
 (22) ·01778. (23) ·23. (24) £2157 4s. 2½d. (25) £72 13s. 5½d.
 (26) 61½ bushels. (27) 800. (28) 150 bushels, 0 pecks, 1 gal-
 lon, 6 pints. (29) 414 cwt., 3 qrs., 26 lbs., 1 oz. (30) 28½.
 (31) 12½. (32) 2½. (33) ⅓. (34) 2 tons, 14 cwt., 3 qrs.,
 14 lbs. (35) ½. (36) 1217·59599. (37) ·1180368. (38)
 85·75. (39) 12·985718.
-

SET 16.

- (1) 222 tons, 4 cwt., 1 qr., 18 lbs., 3 oz. (2) 45064. (3)
 £3 17s. 7½d. (4) 12 days, 6 hours. (5) £113 8s. 1½d. (6)
 £1154 8s. 11½d. (7) 16 days. (8) £8 8s. 0d. (9) 4½ years.
 (10) £925. (11) £220 5s. 1½d. (12) £19 8s. 6½d. (13) 26½.
 (14) 6½. (15) 34½. (16) ⅓. (17) ⅓. (18) 545·88137.
 (19) 3·30241. (20) ·00827919. (21) 2·746. (22) ·13125. (23)
 2 acres, 3 roods, 15 perches, 6 yards, 8 feet, 45 inches. (24) 17
 acres, 3 roods, 10 perches. (25) 16 tons, 16 cwt., 0 qrs., 27 lbs.,
 4 oz. (26) £1 16s. 7d. (27) £19 16s. 6d. (28) £1258 12s. 0d.
 (29) £3 17s. 7½d. (30) £21 2s. 1d. (31) 34½. (32) 1½.
 (33) 2½. (34) 4½. (35) ⅓. (36) 691·1612056. (37) 2·60401.
 (38) 91·53754. (39) 0·54518

SET 17.

(1) £86 19s. 11³/₂d. (2) £116 11s. 7d. (3) \$11 0s. 6d. (4) £249 10s. 2¹/₂d. (5) £60. (6) 4. (7) 201224. (8) 127 lbs., 11 oza., 6 dwts., 3 grains. (9) 661 fathoms, 4 feet, 3 inches. (10) 12 days, 2 hours, 48 minutes, 54 seconds. (11) 42⁷/₈. (12) 51¹/₂. (13) 3¹/₂. (14) 15²/₅. (15) 1¹/₂. (16) 3 acres, 0 roods, 9 perches. (17) £2782 10s. 0d. (18) 2 acres, 0 roods, 31 perches. (19) £1 15s. 0d. (20) 668-6974979. (21) 25-99427. (22) 1-85679249. (23) -5365. (24) -39. (25) 15s. 10¹/₂d. (26) 215 weeks, 3 days, 3 hours. (27) 199 acres, 2 roods, 37 perches. (28) 261¹/₂. (29) 7²/₅. (30) 2¹/₂. (31) 1¹/₅. (32) 8 lbs., 2-812 ozs. (33) £1 10s. 3d. nearly. (34) -48. (35) 6075 lbs., 1 oz., 8 drams, 1 scruple. (36) 2 years, 49 weeks, 6 days. (37) £4522 14s. 0d. (38) £836. (39) 79128.

SET 18.

(1) £985 19s. 9d. (2) £592 1s. 6³/₂d. (3) 34 acres, 2 roods, (4) £14 18s. 0d. (5) 31¹/₂. (6) 5¹/₂. (7) 28¹/₂. (8) 2¹/₅. (9) 1¹/₂. (10) 5¹/₂ per cent. (11) 237-401103. (12) 2-9944. (13) 142-3478784. (14) 30-02. (15) 16 cwt., 3 lbs., 8 oza. (16) 0-175. (17) 13 tons, 6 cwt., 17 lbs., 3 oza. (18) 14352. (19) 39. (20) £3583 7s. 9d. (21) £1 10s. 0d. to each of ten, and £2 12s. 6d. to the remaining man. (22) 9 hours. (23) £6736 14s. 8¹/₂d. (24) 37¹/₂. (25) 8¹/₂. (26) 52. (27) 3¹/₂. (28) 15 cwt., 3 qrs., 24 lbs., 6 oza. (29) ¹/₅. (30) ¹/₂. (31) 2298-629496. (32) 78-918241. (33) -3809773. (34) 15-808 (35) 1-4. (36) £4 2s. 1¹/₂d. (37) -1875. (38) -015 (39) 1-076928.

SET 19.

(1) 7s. 5¹/₂d. (2) 8 days. (3) 18 acres, 0 roods, 8 perches, 26 yards, 1 foot. (4) 38171. (5) 19. (6) 3 days. (7) 6 years, 41 weeks, 2 days, 8 hours. (8) 56 acres, 2 roods, 37 perches. (9) 2 yards, 2 qrs., 2 nails. (10) £6 9s. 6d. (11) 43¹/₂. (12) 9¹/₂. (13) 6¹/₂. (14) 51. (15) 37 tons, 19 cwt., 2 qrs. (16) £6 9s. 11¹/₂d. (17) ¹/₅. (18) 6630-453196. (19) 24-887746 (20) 1721-54779964. (21) 19-4812. (22) 5 acres, 2 roods, 22-5 perches.

SET 19—Continued.

- (23) 0265625. (24) 3065 loads, 1 quarter, 1 peck, 6 pints.
 (25) 381603 $\frac{1}{2}$. (26) 23 miles, 1 furlong, 23 perches, 3 yards,
 1 foot. (27) 210 lbs. (28) £536 11s. 4 $\frac{1}{2}$ d. (29) £98 1s. 7d.
 (30) 4 $\frac{1}{2}$ years. (31) £1057 10s. 0d. (32) 113 $\frac{1}{2}$ $\frac{1}{2}$. (33) 3 $\frac{1}{2}$ $\frac{1}{2}$.
 (34) 2 $\frac{1}{2}$. (35) 1 $\frac{1}{2}$ $\frac{1}{2}$. (36) 1515-356518. (37) 3-999869.
 (38) 70. (39) 1-338842 . . .

SET 20.

- (1) 53 $\frac{1}{2}$ $\frac{1}{2}$. (2) 6 $\frac{1}{2}$ $\frac{1}{2}$. (3) 44 $\frac{1}{2}$. (4) 2 $\frac{1}{2}$ $\frac{1}{2}$. (5) 1 $\frac{1}{2}$ $\frac{1}{2}$. (6) 4 miles,
 17 perches, 2 yards, 2 feet, 3 inches. (7) 590782 $\frac{1}{2}$. (8) 75 miles,
 2 furlongs, 10 perches, 8 yards, 1 foot, 7 inches. (9) 7438-0638667.
 (10) 5-330744. (11) 1-00181031. (12) 03946. (13) 7s. 0 $\frac{1}{2}$ d.
 (14) 35. (15) £4672 1s. 4 $\frac{1}{2}$ d. (16) £6 11s. 3d. (17) £55 16s.
 2 $\frac{1}{2}$ d. (18) 7 $\frac{1}{2}$ days. (19) 75. (20) £61 7s. 11d. (21) £1199 14s. 0d.
 (22) £1 6s. 0 $\frac{1}{2}$ $\frac{1}{2}$ d. (23) £5 5s. 7 $\frac{1}{2}$ d. (24) 6. (25) 6 years, 331.
 days, 22 hours, 17 minutes, 14 seconds. (26) 4261 $\frac{1}{2}$. (27) £4
 16s. 0d. (28) 34 lbs., 3 oz., 1 dram. (29) 16 $\frac{1}{2}$ years. (30).
 38 $\frac{1}{2}$ $\frac{1}{2}$. (31) 2 $\frac{1}{2}$ $\frac{1}{2}$. (32) $\frac{1}{2}$. (33) 2 $\frac{1}{2}$. (34) 1 $\frac{1}{2}$ $\frac{1}{2}$. (35) 380-3167821.
 (36) 12-576246. (37) 000253946. (38) 0772. (39) £1 11s. 6d.

SET 21.

- (1) 6841860. (2) 8 lbs., 3 ozs., 7 drams, 1 scruple, 4 grains.
 (3) 22 cwt., 0 qrs., 16 lbs. (4) 1 stone, 7 lbs. to each of eight;
 and 2 stone 10 lbs. to the ninth. (5) £328 10s. 11 $\frac{1}{2}$ d. (6) £14
 1s. 1 $\frac{1}{2}$ d. (7) £104 19s. 5d. (8) 6. (9) £6 5s. 7 $\frac{1}{2}$ d. (10) 1870
 loads, 4 quarters, 6 bushels, 1 gallon, 5 pints. (11) 474509640.
 (12) 8 $\frac{1}{2}$ years. (13) 4 lbs. (14) 35 $\frac{1}{2}$ $\frac{1}{2}$. (15) 20 $\frac{1}{2}$ $\frac{1}{2}$. (16) 2 $\frac{1}{2}$.
 (17) 9 $\frac{1}{2}$ $\frac{1}{2}$. (18) 140 $\frac{1}{2}$. (19) 2 $\frac{1}{2}$. (20) 2 miles, 4 furlongs,
 25 $\frac{1}{2}$ perches. (21) 494-788026. (22) 163-50378274. (23)
 162885174. (24) 0785. (25) 1875. (26) £3 15s. 6 $\frac{1}{2}$ d. (27)
 £343 4s. 0 $\frac{1}{2}$ $\frac{1}{2}$ d. (28) £11 7s. 10d. (29) 3082 loads, 4 quarters, 2
 bushels, 1 peck, 6 pints. (30) 48-2 $\frac{1}{2}$ $\frac{1}{2}$. (31) 3 $\frac{1}{2}$. (32) 5 $\frac{1}{2}$. (33)
 9. (34) £12 4s. 6d. (35) 588-591465. (36) 6-27514. (37)
 1-6785462. (38) 8041540. (39) 2777772 . . .

SET 22.

- (1) 338 miles, 3 perches, 1 yard, 6 inches. (2) 41016960.
 (3) 211 acres. (4) £33 6s. 11d. (5) 2 lbs., 4 oz. (6) 30. (7)
 43½. (8) 8½. (9) 1½. (10) 16½. (11) 615712 ozs. (12)
 126 acres, 0 roods, 30 perches, 6 yards, 2 feet, 72 inches. (13)
 £110 18s. 8d. (14) £425 7s. 7½d. (15) 4 years. (16) £74 10s.
 6d. (17) £512 10s. 0d. (18) £12 12s. 8d. (19) £180. (20)
 £2071 1s. 4d. (21) £65 17s. 5½d. (22) 2860. (23) £58 13s.
 9½d. (24) 4. (25) 2 years, 178 days, 3 hours, 32 minutes, 25
 seconds. (26) Each of three gets £2 10s. 0d., a fourth gets
 £3 19s. 0d., and the fifth £4 10s. 6d. (27) £318 15s. 0d. (28)
 58½. (29) 6½. (30) 8½. (31) 19½. (32) 21 acres, 1 rood,
 22 perches. (33) ½. (34) 2. (35) 557·8814946. (36) 1·591154.
 (37) 24·889194. (38) ·02900752. (39) 2·1.

SET 23.

- (1) £141 18s. 4½d. (2) £4 15s. 9d. (3) 3 acres, 3 roods, 29
 perches, 25 yards. (4) 1094 gallons. (5) 3 acres, 1 rood, 34
 perches, 23 yards, 5 feet, 130 inches. (6) 1059 ells, 4 quarters,
 7 inches. (7) 15 acres, 15 perches, 30 yards, 2 feet, 7 inches.
 (8) £176 14s. 0d. (9) £16. (10) £16 16s. 0d. (11) 21 guineas.
 (12) £39 12s. 6½d. (13) 6½. (14) ½. (15) ½. (16) ½.
 (17) 3567·965729. (18) 7·08486. (19) 376·321008. (20) 2500.
 (21) £2742 15s. 8d. (22) 1096. (23) 160 square yards, 2 feet,
 72 inches. (24) £20 12s. 6d. (25) 107850. (26) 40. (27) £703
 2s. 6d. (28) £16 17s. 4½d. (29) £16 8s. 4d. (30) 4 years.
 (31) 133 tons, 12 cwt., 3 qrs., 4 lbs., 11 oz. (32) £125 14s. 9d.
 (33) £112. (34) £70 9s. 10½d. (35) £454 7s. 9d. (36) £2 10s.
 1½d. (37) £6595 19s. 8½d. (38) £1364 8s. 0d. (39) £119 5s.
 £1192 10s.; £1325.

SET 24.

- (1) 94½. (2) 12½. (3) 1½. (4) 10. (5) ½. (6) ½. (7)
 466·673037. (8) 48·9407211. (9) 1·382749342. (10) ·01079.
 (11) ·00398 &c. (12) 1½. (13) 2800928. (14) 7 acres, 2 roods,
 21 perches, 21 yards, 8 feet, 21 inches. (15) 8896. (16) 288.
 (17) 806½. (18) 216 acres, 0 roods, 11½ perches. (19) £10
 16s. 0d. (20) £14 8s. 0d. (21) £60. (22) 100. (23) £36.
 (24) £76 6s. 3d. (25) £2194 6s. 0d. (26) £120 4s. 1d. (27) 4.

SET 24—Continued.

(28) £1087 10s. 0d. (29) £17 7s. 6d. (30) 90½d. (31) 9½.
 (32) 6. (33) 6½. (34) 11¼. (35) 429·1122074. (36)
 90·89844 (37) ·0000046246022. (38) ·25227. (39) 3·6.

SET 25.

(1) £2788 2s. 4½d. (2) £995 10s. 0d. (3) £121 7s. 9½d.
 (4) 498064. (5) 13½. (6) 4½. (7) 4½. (8) 1½. (9)
 5050·00967854. (10) 572·37931. (11) 60·2120916. (12) 2600.
 (13) ·00625. (14) £7507 3s. 0d. (15) £157 15s. 6½d. (16)
 £647 10s. 0d. (17) 931 quarters, 4 bushels, 1 peck, 4 pints. (18)
 6209280. (19) 103899672. (20) 45. (21) £15585 18s. 9d. (22)
 6½. (23) £120 15s. 0d. (24) 649 loads, 0 quarter, 2 bushels,
 3 pecks. (25) 198 acres, 3 roods, 36 perches. (26) 16½.
 (27) 3½. (28) 3½. (29) 2½. (30) 1. (31) 5513·45859572.
 (32) 2·448718. (33) 2·31497562. (34) ·01057. (35) 33858.
 (36) 3½. (37) £21269 17s. 0d. (38) £3 12s. 4d. (39) 56 acres,
 3 roods, 18 perches to each of twenty-seven, 82 acres, 1 rood,
 17 perches to each of the two.

SET 26.

(1) 20 tons, 11 cwt., 1 qr., 1 lb., 8 ozs. (2) 186 loads, 1 qr.,
 4 bushels, 3 pecks, 1 gallon, 1 pint. (3) 1101024. (4) £1404
 3s. 6½d. (5) £668 5s. 3½d. (6) 501 lbs. (7) 23½. (8) 8½.
 (9) 38½. (10) 17½. (11) ½. (12) 3500·20517106. (13)
 ·995964. (14) ·5611264. (15) 0·61708. (16) ·65625. (17)
 15 days. (18) £29 3s. 11d. (19) 9 tons, 7 cwt., 2 qrs. (20)
 £325. (21) £70 10s. 0d. (22) 4. (23) £429 15s. 8d. (24)
 £39 18s. 4½d. (25) 208. (26) £344 17s. 0d. (27) £211 10s. 9½d.
 (28) 403 lbs., 9 ozs., 15 dwts., 7 grains. (29) 2 miles, 4 fur-
 longs, 29 perches. (30) 39½. (31) 30½. (32) 40. (33) ½.
 (34) 1½. (35) 435·0208247. (36) ·6433727. (37) ·29748. (38)
 1·263736. (39) ·052.

SET 27.

(1) 43½. (2) 1. (3) 23½. (4) 57½. (5) £135. (6)
 2299·4463732. (7) 71·5859492. (8) ·0250379. (9) ·0067.
 (10) ·25. (11) 4883·2. (12) 65 lbs., 8 ozs., 6 drams, 2 scruples,

SET 27—Continued.

3 grains. (13) 160392. (14) 9825. (15) 357. (16) 3 roods, 5 perches, 27 yards, 8 feet, 140 inches. (17) 31. (18) £15 5s. 1½d. (19) £15 14s. 5d. (20) £9 16s. 10½d. (21) 24. (22) £20450 7s. 10½d. (23) 460. (24) 5445. (25) £424 13s. 0d. (26) £134 10s. 6d. (27) £69 14s. 5d. (28) £54 13s. 9d. (29) 4. (30) 27½. (31) 5½. (32) ½. (33) 6½. (34) 2 yards, 2 qrs., 1 nail. (35) 4839·9911631. (36) 846074. (37) 2619·9177636. (38) 6961. (39) 85.

SET 28.

(1) £541 12s. 2d., and £48 0s. 1d. (2) £933 6s. 8d. (3) £227 10s. 4½d. (4) ½d. (5) £18 18s. 0d. (6) 1708 loads, 3 quarters, 1 bushel, 1 peck, 1 quart, 3 gills. (7) 1027 fathoms, 1 foot, 8 inches. (8) 2047320. (9) £3 11s. 9½d. (10) 17. (11) £378 15s. 0d. (12) 59½. (13) 4½. (14) 6½. (15) 1½. (16) ½. (17) 1½. (18) 4425·2878931. (19) 00830661. (20) 01364688. (21) 0·5935. (22) 05. (23) £66 2s. 3d. (24) £38 2s. 2½d. (25) £4589 15s. 4½d. (26) 4 years. (27) 12 years, 38 weeks, 4 days, 22 hours. (28) 17. (29) £212 8s. 5½d. (30) 67½. (31) 8½. (32) 24½. (33) 90½. (34) 1190. (35) 836·535926. (36) 5·9382352. (37) 299·26321824. (38) 04. (39) 1·642543 . . .

SET 29.

(1) 36½. (2) 2½. (3) 1½. (4) 1½. (5) 21 cwt., 7 lbs. (6) 2530·529249. (7) 50·4567431. (8) 4·667488. (9) 0909. (10) 3 lbs., 3 ozs., 8 drams. (11) 6. (12) £37 10s. 0d. (13) £289 18s. 8½d. (14) £2 13s. 1½d. (15) £30938 12s. 0½d. (16) £0 5s. 5d. (17) 218 tons, 18 cwt., 3 qrs., 16 lbs., 7 ozs. (18) 12252384. (19) 17069 loads, 3 qrs. 4 bushels, 2 pecks, 1 gallon, 1 pint. (20) 23. (21) 8 miles, 7 furlongs, 30 perches, 3 yards. (22) £50 16s. 8d. (23) 79½. (24) 26½. (25) 1½. (26) 1½. (27) 6 furlongs, 30 perches, 4½ yards. (28) 4489·1623632.

SET 29—Continued.

- (29) 4.36886. (30) .1009188. (31) 105.8933. (32) .676.
 (33) £433 15s. 11½d. (34) £66 9s. 7d. (35) 2½ years. (36)
 £369. (37) £100 11s. 1½d. (38) 5 cwt., 3 qrs., 18 lbs., 1 oz.
 (39) £101 19s. 7½d.

SET 30.

- (1) 38½. (2) £10014 19s. 0d. (3) 8. (4) 11 hours, 40
 minutes. (5) £1 18s. 1½d. (6) £11 3s. 5½d. (7) 28½. (8) ½.
 (9) 2½. (10) ½. (11) ⅜. (12) ¼. (13) 2508.90516796. (14)
 13.7337764. (15) 6607.5601. (16) 1.2807. (17) .4873125.
 (18) 11s. 9d. (19) 83 lbs., 1 oz., 3 dwts., 8 grains. (20)
 270899640. (21) 6 lbs., 2 ozs., 2 drams, 2 scruples, 18 grains.
 (22) 401456. (23) 41. (24) 8866. (25) £53 3s. 2d. (26)
 £11 16s. 2½d. (27) £8261 19s. 7½d. (28) 5½. (29) £6 14s. 9d.
 (30) £42. (31) 28⅞. (32) 4½. (33) 14. (34) 4½. (35)
 ⅜. (36) 4054.26763321. (37) .910982. (38) .8041540. (39)
 2.777983 . . .

MISCELLANEOUS EXERCISES.

SUBTRACTION.

- (1) £6735 17s. 0½d. (2) 1 ton, 16 cwt., 3 qrs., 2 lbs., 5 oz.
 (3) 5 yrs., 336 days, 2 hrs., 50 minutes. (4) 16 loads, 2 bush.,
 2 pecks, 3 pts. (5) 37 lbs., 10 oz., 13 dwts., 20 grs. (6) 5 ac., 1 rd.,
 18 per., 20 yds. (7) 200 mls., 3 fur., 9 per., 1 ft., 10½ in. (8) 4 lbs.,
 8 ozs., 1 dr., 1 scruple. (9) £2 14s. 9d. (10) £0 18s. 4½d.

MULTIPLICATION.

- (11) 1893 ac., 3 rds., 20 per. (12) £627412 7s. 2½d. (13)
 £72 18s. 7½d. (14) £73 10s. 0d. (15) 534 mls., 6 fur., 35 per.,
 2½ yds. (16) 1282 ac. 3 rds., 32 per. (17) 80 weeks, 5 days,
 8 hours. (18) 401 lbs., 9 oz., 8 dwts., 6 grains. (19) 6150
 cwt., 8 lbs., 4 oz. (20) 150 bush., 1 gall., 6 pints

REDUCTION.

- (21) 36,080,640. (22) 201,472. (23) 2839½. (24) 432. (25) 2862.
 (26) 636872. (27) 79290. (28) 560032. (29) 221832. (30) 45716.
 (31) 78 ac., 38 per., 9 yds., 5 ft., 72 in. (32) 54 tons, 19 cwt., 3
 qrs., 16 lbs. (33) 376020. (34) 3376 qrs., 2 pecks, 6 pints. (35)

REDUCTION.—continued.

2084 loads, 4 qrs., 6 bush., 1 gall., 4 pts. (36) 11736. (37) 94639 gs. 17s. 2½d. (38) 2192 fath., 5 ft., 8 in. (39) 64 weeks, 3 days, 23 hrs., 3 min., 42 seconds. (40) 272 lbs., 8 oz., 18 dwts.

DIVISION.

(41) 12 lbs., 2 oz., 14 dwts., 16 grains. (42) 4 ac., 2 rds., 28 perches. (43) 9 cwt., 2 qrs., 17 lbs. (44) 10 tons, 2 qrs., 9 lbs. (45) £34 9s. 7½d. (46) 2 tons, 11 cwt., 2 qrs. (47) £154 7s. 3½d. (48) 16. (49) 12 cwt., 2 qrs., 1½ lbs. (50) 4 lbs., 11 oz., 18 grains. (51) 3 bush., 3 gall., 5 pts. (52) 17 lbs., 6 oz., 13 dwts., 17 gra.

SIMPLE PROPORTION.

(53) £1 12s. 0d. (54) £0 15s. 6¾d. (55) £4 12s. 1¾d. (56) 9 days. (57) £0 15s. 11½d. (58) 9½ hours. (59) 20. (60) £41 8s. 4d. (61) £199 18s. 4½d. (62) 31 lbs., 14 oz. (63) 10 oz. (64) £15 12s. 0d. (65) £19 5s. 8½d. (66) £8 14s. 0d. (67) £71 17s. 6d.

COMPOUND PROPORTION.

(68) £183 3s. 0d. (69) £900 0s. 0d. (70) 20. (71) 2 weeks. (72) 302½ days. (73) 3½ lbs. (74) £2 10s. 0d. (75) 16. (76) 16. (77) £34 8s. 6d.

FRACTION.

(78) £47 15s. 6¾d. (79) £2516 10s. 7½d. (80) £14361 15s. 11d. (81) £167 13s. 2½d. (82) £3804 11s. 5¾d. (83) £23 9s. 9¾d. (84) £3141 3s. 1d. (85) £663 15s. 1½d. (86) £272 14s. 4½d. (87) £354 17s. 0d. (88) £67 13s. 9½d. (89) £141 4s. 4d. (90) £29 16s. 7½d. (91) £637 12s. 2½. (92) £138 7s. 6½d.

INTEREST.

(93) £92 2s. 10½d. (94) £531 12s. 4-23d. (95) £15 0s. 3-4375d. (96) £372 10s. 1-62d. (97) £116 14s. 3-20d. (98) £11 9s. 4-200d. (99) £92 6s. 7-22d. (100) £12 4s. 3-85d. (101) £319 12s. 2-48d. (102) £291 7s. 2-800d. (103) £328 17s. 11-88d. (104) £139 13s. 6-220d. (105) £29 16s. 1-88d. (106) £2 2s. 7-88d. (107) £19 8s. 8-88d. (108) £15 5s. 8-88d. (109) £27 19s. 2-8d. (110) £15 8s. 10-88d. (111) 4. (112) £900. (113) 7½. (114) 2½ yrs. (115) £650. (116) 8½ yrs.

DISCOUNT.

(117) £956 5s. 0d. (118) £1637 10s. 0d. (119) £351 11s. 3d. (120) £543 15s. 0d. (121) £251 3s. 2-7d. (122) £937 10s. 0d. (123) £2167 1s. 4-33d. (124) £4906 11s. 5-28d. (125) £662 7s. 4-33d. (126) £677 6s. 4-33d. (127) £154 13s. 1-77d. (128) £943 11s. 4-33d. (129) £19 14s. 5-28d. (130) £9 18s. 6-28d. (131) £1 19s. 11-7d. (132) £10 3s. 8-7d. (133) £28 13s. 3-33d. (134) £15 13s. 7-33d.

AVERAGES AND PERCENTAGES.

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A.

(1) £20000, £9750, £7750, £12500, and $62\frac{1}{2}$ per cent. (2) £25967 and £10387. (3) 150449 tons, 10·7, and 25·6. (4) £1 0s. 10½d (5) 52491 and 1·98548.

B.

(1) 14s. 0½d. (2) 3½. (3) 1·39 gain; 6·27 loss; 5·2 gain on the three cities respectively, and 77 gain on the whole. (4) £36630 12s. and 81·89. (5) $12\frac{1}{18}$ years.

C.

(1) £82. (2) £62 10s. 0d. gained. (3) $2\frac{1}{2}$ miles and $17\frac{1}{2}$ miles. (4) £4224300; 89·8. (5) £4 7s 3½d.

D.

(1) £10800. (2) 3. (3) $31\frac{1}{11}$ miles. (4) 37. (5) 56.

E.

(1) 2 yards. (2) £217 18s. 4d. (3) £35600. (4) 10½. (5) 5.

F.

(1) $33\frac{1}{2}$. (2) 35·8. (3) £10000. (4) 27·58 miles. (5) 4 miles.

ADVANCED ARITHMETIC.—ANSWERS.

A.*

(1) 7et; 402583; 2619047. (2) 4112; 1589349609375; $\frac{1}{10}$. (3) 1 t ce 3; 224243; 3t800963. (4) 20969; 101. (5) 862. (6) 16325130; 6460e9; 23042. (7) 9868; 54; 1131. (8) 4334; 4334; 100. (9) 345; 303; 141501; 42. (10) 75 ac. 1 rd. 18 per. 27 yds. 8 ft. 73 in. (11) 3. (12) 2488. (13) 560376; 3307; 414; 1369098. (14) t 9 t 6; 85488400. (15) 234521; 7 t. t 88. (16) 109 t 9; 91 t; 23121.

B.*

(1) 0436. (2) 218 yds. 9 ft. 486 in.; £393 0s. 4½d. (3) 15215; 282 ac. 3 rd. 12 per. 27 yds; 1170. (4) See Key. (5) 7½. (7) See Key. (9) £105; £62 12s. 6d. (10) £338 17s. 10½d.; £7116 15s. 4½d. (11) £6380; £6039 18s. 4d. (12) £543 15s.; £362 10s.; £271 17s. 6d.; £392 14s. 2d. (13) $5\frac{1}{2}$ gain. (14) 8s. 13199d. (15) 8 30' p.m.

C.*

(1) 2083; 4460. (2) 089466. (3) 848 ft. 2½ in.; 10½ ft.; £63 2s. 0½d. (4) 375; 13. (5) £2 6s. 8d.; 20. (6) 5. (7) £168; £35; 4. (9) 86 yds. 72 secs. (10) 34; 4250. (11) 800; 500; 300. (12) £2400. (13) 42 ac. 21 per. (14) 32½ ft. (15) Friday, 26th June, 1761. (16) 105.

D.*

(1) 17. (2) $1\frac{1}{11}$. (3) 15025. (4) 125. (5) 08; 2·5. (6) The third. (7) £3,000; £2,000; £1,500. (8) 64 days. (9) £4,000 (10) £2,000.

(1) 2. 3°. 52. 7. 11°. 13. 19. (2) 1567·0468659. (3) 1. (4) $\frac{7}{11}\frac{1}{11}\frac{1}{11}$. (5) 26 lbs. 9 oz. 10 dwts. 0·98 grs. (6) 3. (7) 16 days. (8) £16 5s. (9) £366 3s. 4d. (10) 4½ hrs.; 5½ hrs. (11) £7,500. (12) $3\frac{1}{11}$; 08°

ADVANCED ARITHMETIC PAPERS.

A.

(1) 3249—57s. (2) $17\frac{1}{2}$ days. (3) 5s. and 4s. (4) £16 gain. (5) $10\frac{1}{2}$ miles. (6) A gets £7000, B £8500, and C £20800, Capital £20000. (7) $75\frac{1}{2}$. (8) 5. (9) 1.48. (10) 8 feet. (11) A 240, B 360, C 300, D 400. (12) 21.

B.

(1) £5246 5s. 0d. (2) 9:5. (3) £18000. (4) Loss of 1 per cent. (5) £42 17s. $4\frac{1}{2}$ d. (6) 12 feet. (7) 1 acre $22\frac{1}{2}$ perches. (8) £9880. (9) 75. (10) 25s. (11) $22\frac{1}{2}$. (12) $2\frac{1}{2}$ months.

C.

(1) 18s. 4d. (2) 192-03563. (3) $1\frac{1}{2}$. (4) 15' and $9\frac{3}{4}$ '. (5) 8000, 7200, and 6750. (6) 5 ozs., 7 dwts., $3\frac{1}{2}$ grains. (7) £65275 has been invested in each; and the $3\frac{1}{2}$ per cents. is the better investment. (8) 14, 12, and 16 days respectively. (9) $57\frac{1}{2}$. (10) 16 lbs. of the 3s. 9d. tea to 3 lbs. of each of the others—544 lbs., 83 lbs., 33 lbs., and 176 lbs. (11) 9. (12) 6 years.

D.

(1) $\frac{1}{2}$. (2) 10 months. (3) £666. (4) 3s. and 4s. (5) 102. (6) $4234\frac{1}{2}$. (7) 307-003. (8) 15. (9) 6d. for 25 apples, 2d. for 5 pears, and 9d. for 10 oranges. (10) 1-0457574, 1-09691, 3-30103, 2-3344539, 0-0334239, 1-3467874. (11) £1316 3s. 4d. (12) 14-625.

E.

(1) 30-205. (2) £0 2s. $7\frac{1}{2}$ d. (3) 10° . (4) -00000362811. (5) 3 years. (6) £0 4s. 2d. = tea, £0 1s. 2d. = chocolate. (7) $\frac{1}{2} \sqrt{3}$. (8) £5 19s. 8d. (9) 23lbs., 8oz., 12dwts., 22-46875grs. (10) $382\frac{1}{2}$ feet. (11) $2838\frac{1}{2}$ cubic feet. (12) 129 yards.

F.

(1) £270- $\frac{1}{2}$. (2) $2\frac{1}{2}$ miles. (3) A 15, B 30, C 60 days. (4) 2,703,360. (5) 20, 40. (6) 12 half crowns, 24 pence, 36 sovereigns, 96s. (7) 9704 cubic feet, $885\frac{1}{2}$ cubic inches. (8) 90-0003. (9) A £336, B 420, C 210. (10) £1 what he received in January, £23 in December. (11) 122212111. (12) $2^5 \times 3^2 \times 5^2 \times 7$ and 302400.

G.

- (1) $3\frac{1}{2}$ hours, and A walks $12\frac{1}{2}$ miles, B $14\frac{1}{2}$. (2) 3·069 and 13·3. (3) 15d. (4) ·8172. (5) 11 feet $2\frac{1}{2}$ inches. (6) 56 feet. (7) $125\frac{1}{2}$ sq. feet. (8) $3\frac{1}{2}$ per Cents. (9) £1 5s. 0d. (10) On 15th June at $10\frac{1}{2}$ minutes past eleven o'clock, a.m., 56' $28\frac{1}{4}$ " past ten, and 36' $28\frac{1}{4}$ " past eleven. (11) $58\frac{1}{2}$. (12) 4s.

H.

- (1) $5\frac{1}{4}$ minutes past 10, $21\frac{1}{4}$ minutes past 10, $54\frac{1}{4}$ minutes past 10. (2) 18s. 10 $\frac{1}{2}$ d. (3) £0 5s. 7 $\frac{1}{2}$ d. (4) £710 $\frac{1}{2}$ and 1206 $\frac{1}{4}$. (5) 12420. (6) $41\frac{1}{2}$. (7) £1 0s. 8 $\frac{1}{2}$ d. (8) 4226, 98 over. (9) 4 stone, £3 $\frac{1}{2}$ per ton. (10) £2 6s. 9 $\frac{1}{2}$ d. (11) See Key. (12) 4s. 6 $\frac{1}{2}$ d.

I.

- (1) 75. (2) $27\frac{1}{4}$. (3) 530. (4) ·0012 and ·06. (5) 18. For solutions to 6 and 7 see Key. (8) 1:40·46. (9) 18 $\frac{1}{4}$ minutes past 1. (10) 88 $\frac{1}{2}$. (11) 221540 $\frac{1}{2}$. (12) £90 3s. 1 $\frac{1}{2}$ d.

J.

- (1) 3 feet 9 inches. (2) $\frac{1}{2}$ and 594. (3) $\frac{1}{1000}$, ·0009. (4) $1\frac{1}{2}$. (5) £37 10s. 0d. (6) £360. (7) The English navvies are most profitable, £4,000. (8) 15 and 384. (9) £1258 19s. 6 $\frac{1}{2}$ d. (10) £700 in 3 per cents., and £600 in 5 per cents.; $\frac{1}{4}$ loss. (11) 1·049, &c. (12) 69 $\frac{1}{2}$.

K.

- (1) $6\frac{1}{2}$ days. (2) $1\frac{1}{2}$. (3) A's stock is £4,000, B's stock £2,500; A's profit is £1,523 $\frac{1}{4}$ and B's = £951 $\frac{1}{4}$. (4) £195. (5) £108. (6) 192 and 150. (7) £1,000. (8) $1\frac{1}{2}$. (9) £100 = A's, £166 13s. 4d. = B's, £333 6s. 8d. = C's. (10) £200 = A's, £120 = B's, £225 = C's. (11) 702 for defeated candidate, 1,458 for successful candidate, gross = 2,430. (12) £10 = gain on first half, £20 = gain on second half; 6 per cent.

L.

- (1) ·632, ·0016. (2) £12 15s. 0d. (3) 50 tons, 12 cwt., 3 qrs., 9 lbs., 8 ozs.; 82,410 tons, 14 cwt., 1 qr., 4 lbs. (4) $2\frac{1}{2}$. (5) 45 miles. (6) 26722·36. (7) 812 cubic feet 1551 $\frac{1}{2}$ inches. (8) $5\frac{1}{4}$. (9) 196 yards, 2 feet, 3·8 inches. (10) £1,835 $\frac{1}{2}$, £81 $\frac{1}{2}$. (11) 9,450 links. (12) £32 3s. 4d., 1·021164. (13) £0 14s. 9·876d. (14) ·7182818. (15) £242,914 $\frac{1}{2}$.

M.

- (1) 1000. (2) 8·495 (3) 18·4325. (4) 80 per cent. lost. (5) 11 hours. (6) 450 cubic feet, 766 $\frac{1}{2}$ inches. (7) £4 15s. 2 $\frac{1}{2}$ d., £16 $\frac{1}{2}$. (8) £28 11s. 9 $\frac{1}{2}$ d. (9) 914 yards, 1 foot, 7 inches. (10) 36 $\frac{1}{2}$. (11) $1\frac{1}{2}$. (12) 2505·078125. (13) 62 $\frac{1}{2}$. (14) 94·575 (15) For solution see Key.

N.

- (1) £588 11s. 10 $\frac{1}{2}$ d. (2) .081 and 1.08. (3) 86. (4) £3 0s. 1 $\frac{1}{4}$ d. (5) 104 feet, 1826 $\frac{1}{2}$ inches. (6) 820.128, &c. (7) 5 chains, 4.625 links, and 111 yards, .063 feet. (8) 6 remain. (9) £3 2s. 2 $\frac{1}{2}$ d. (10) 121695. (11) £584 6s. 6d. (12) 1458. (13) 8 feet, 8 inches, and 22280 lbs. 7 ozs. 6 dwts. 9 $\frac{1}{2}$ grains. (14) £621 13s. 4d., including taxes.

O.

- (1) 8 lbs. 7 ozs. 8 dwts. (2) 726. (3) 2 pence remainder. (5) .9961. (6) 78.52515, &c. (7) 54950. (8) He answers 52 per cent., and passes. (9) £25. (10) 1950. (11) 83.5505 acres. (12) 192000. (13) £241 10s. 0d. (14) see Key.

P.

- (1) .0955753246. (2) £120; £3 10s. 8 $\frac{1}{2}$ d. (3) £11 15s. 2 $\frac{1}{2}$ d. (4) 750. (5) 56 hours. (6) 68 cubic yards, 26 feet. 1064 inches. (7) £16 2s. 10 $\frac{1}{2}$ d. (8) .083 & .04. (9) 2.2239. (10) 10 inches. (11) 6.339 inches. (12) 88 $\frac{1}{4}$ past seven. (13) 25.75 yards and 80.9 yards. (14) £125. (15) .24.

Q.

- (1) 4.12310562. (2) 4244. (3) 4065 $\frac{1}{2}$. (4) £36 loss. (5) 8 $\frac{1}{4}$ feet, and 40 tons, 17 cwt., 19 $\frac{1}{2}$ lbs. (6) See Key; 17480+12. (7) 3.6142857. (8) 14 $\frac{1}{2}$. (9) 3 cwt. 2 qrs. 28 lbs. (10) 2 $\frac{1}{2}$. (11) 10 $\frac{1}{2}$. (12) 1 $\frac{1}{2}$. (13) £1336 13s. 4d. (14) 95 $\frac{1}{4}$.

R.

- (1) 3522178; 8,998,936,616. (2) 14 days, 7 hours, 11', 17", and 2674 days, 9', 59". (3) $\frac{1}{2}$. (4) 8738. (5) 1100 feet per sec. (6) 44 $\frac{1}{2}$. (7) 4374. (8) 11 feet, 1207 $\frac{1}{2}$ inches. (9) 34 $\frac{1}{2}$. (10) £1 per share. (11) £10. (12) 77 $\frac{1}{2}$. (13) 3. (14) B wins by 50 yards in 4 $\frac{1}{2}$ '. (15) 150 lbs.

S.

- (1) 3527160; 6 $\frac{1}{2}$. (2) 9 $\frac{1}{2}$; 26457. (3) £12000. (4) £971 11s. 3 $\frac{1}{2}$ d. (5) 892 cub. ft. 244 $\frac{1}{2}$ cub. in. (6) 25 $\frac{1}{2}$ francs. (7) 148 feet. (8) 1 $\frac{1}{2}$; 7 $\frac{1}{2}$. (9) £26 13s. 4d. (10) 8310 yds. (11) 30 $\frac{1}{2}$. (12) 5 $\frac{1}{2}$ grains. (13) 17609.705. (14) 35.38 oz., very nearly. (15) £1886 4s. 6.576d. and £840 9s. 9.504d.

T.

EXERCISE.

- (1) 3 $\frac{1}{2}$. (2) 98. (3) 10 hours, 52', 48". (4) $\frac{1}{2}$ hour each day. (5) 1061 and 893 $\frac{1}{2}$. (6) 10 $\frac{1}{2}$ yards $\times$ 8 $\frac{1}{2}$ yards $\times$ 4 yards. (7) 1 $\frac{1}{2}$. (8) A's £501 16s. 6d.; B's £250 18s. 3d.; C's £83 12s. 9d.; D's £20 18s. 2 $\frac{1}{2}$ d. (9) £2350. (10) 18 $\frac{1}{2}$ per cent. gain. (11) 2037 $\frac{1}{2}$. (12) 2 a. 2 r. 86 p., very nearly. (13) 406 inches. (14) 84.28 inches. (15) £70.

U

- (1) $\frac{3}{4}$ hr. (2) .0074 and $1\frac{1}{4}$. (3) 4 years. (4) £259 14s. 8d. (5) £2394 14s. 9 $\frac{1}{4}$ d. (6) 564. (7) 54 $\frac{3}{4}$ s. (8) $1\frac{1}{2}$ lbs., $1\frac{1}{2}$ lbs., $\frac{3}{4}$ lbs. (9) 80,800,000 francs. (10) $\frac{1}{4}$ gals. (11) 9, 5, 1, 6, or 5, 9, 6, 1. (12) £100 $\frac{1}{2}$. (13) 98a. 1r. 6'82 very nearly. (14) 19,855'6974 sq. inches. (15) 509'208 cubic inches.

V

- (1) (a) See Key; (b) 1'10313131, &c.; (c) $1\frac{1}{2}$ s. (2) £2080. (3) £31350. (4) 1'8 in. (5) £2010. (6) 358'4. (7) (a) See Key; (b) Lost £210 2s. 6d. (8) 3 : 1. (9) 41ft., 432 in. (10) (a) 23°; (b) 4—4°. (11) £1109 15s. 4'7712d. (12) $11\frac{1}{4}$ mins. (13) $21\frac{1}{4}$ gals. water + $2\frac{1}{4}$ gals. wine, and $2\frac{1}{4}$ gals. water + $9\frac{1}{4}$ gals. wine. (14) area = 4318934'235 ft.; circumference = 7367'052 ft. (15) 271338349'9904 ft.

W

- (1) $92\frac{1}{2}$; .026. (2) £1 5s. (3) 494 cub. ft., 1596 $\frac{4}{5}$ in. (4) 36 yds. and 24 yds. (5) t376e0e. (6) 25 : 19. (7) 82'11" past 12. (8) £700. (9) £30 7s. 6d. (10) The 3 $\frac{1}{2}$ per cent.; £ $\frac{3}{4}$. (11) 1054'2665, &c., sq. yds. (12) 904'7808 sq. in. (using 3'1416). (13) 2359'11s. (14) 53'6 (15) $22\frac{1}{2}$ ft.

X

- (1) 12'025; $15\frac{1}{2}$. (2) $\frac{1}{2}$. (3) $1\frac{1}{2}$ hr. (4) 6feet; $4\frac{1}{2}$ feet; 3feet (5) '8311899, etc. (6) 85 $\frac{1}{2}$. (7) Thrice: viz., when winner finishes $1\frac{1}{2}$ miles, and again $2\frac{1}{2}$ miles. (8) 8000. (9) £3,588 7s. 2 $\frac{1}{2}$ d. (10) £92 8s. 0d.; £2,802 16s. 0d. (11) 502'2 square yards. (12) 2671'9308 cubic inches. (13) 35'5884375 square feet. (14) $18\frac{1}{2}$. (15) 6 inches.

Y

- (1) 3'222943. (2) 603729. (3) 0; $5\frac{1}{2}$. (4) £899'11s. 7d. (5) 44989'77, &c., fr. (6) £1,330,800. (7) £28 loss. (8) 8 $\frac{1}{2}$ tons. (9) £1126 8s. 7d. (10) 1,728,000. (11) 320' A, and 316' B. (12) 10 ft. 8in.; $1\frac{1}{2}$ in. (13) A's 261' $\frac{2}{3}$ days; B's 120 days.

SOLICITORS' APPRENTICES.

A

- (1) £64 16s. 0d.; 2s. (2) £19 7s. 5 $\frac{1}{2}$ d. (3) £27 19s. 0 $\frac{1}{2}$ d. (4) $\frac{1}{2}$; $\frac{1}{2}$. (5) 8d.; £3 17s. 1d. (6) 15s.; £386 14s. 4 $\frac{1}{2}$ d.; £305 5s. 0d.; £220.

B

- (1) £230 16s. 8 $\frac{1}{2}$ d. (2) 10 $\frac{1}{2}$. (3) £59 1s. 6 $\frac{2}{3}$ d. (4) £179 8s. 8d.; £142 9s. 0d.; £99 3s. 4d. (5) 264 12s. 0d. (6) £900; £750; £150.

C

- (1) £53786 1s. 0 $\frac{1}{2}$ d. (2) £77 1s. 3 $\frac{1}{2}$ d. (3) $\frac{1}{2}$. (4) £2160. (5) £235 17s. 5 $\frac{1}{2}$ d. (6) £29.

D.

(1) £72 1s. 2½d. (2) £145 18s. 10½d. (3) 6899 halfpence, and 7928 minutes. (4) £48 15s. 0d. (5) 2½. (6) £47 2s. 4½d.

E.

(1) 91 acres, 1 rood, 28½ perches; £1 7s. 4½d. (2) 112 acres, 8 roods, 29 perches. (3) £48985 5s. 1½d. (4) ⅓. (5) £120. (6) 9s. 10½d.

F.

(1) £6 19s. 9½d. (2) 95507006. (4) 866286. (6) £27764 11s. 5½d.

G.

(1) £8 8s. 6d. (2) £140. (3) £1 10s. 0d. (4) £421881 6s. 0½d.; £1238 2s. 11½d. (5) £148 0s. 0½d. (6) £52 7s. 9d.

BANK OF IRELAND.

A.

(1) £68 5s. 11½d. (2) £399 5s. 4½d. (3) £81 7s. 0½d. (4) 2½. (5) 2·335816 and 2·335817. (6) £1 12s. 10½d., and £1 12s. 4½d. (7) £1 2s. 8½d. (8) 6611176; 46·69; 10·09; 43·21. (9) £59 18s. 4½d.

B.

(1) £524 18s. 3½d. (2) £202 7s. 7½d. (3) 10½; 24. (4) 3·142857, and 3·1416929. (5) ·0402252. (6) 9·8696; 81·0064. (7) £1 6s. 6½d., nearly. (8) £1 6s. 11½d., nearly. (9) 16s. 5½d., true discount. (10) 2½d.

C.

(1) £464 15s. 6½d. (2) £279 18s. 6½d. (3) ~~and and and and and~~. (4) ·3183098. (5) 81·00616. (7) £11 6s. 10½d. (8) £2 0s. 9½d. (9) £323 17s. 8½d.; £3 4s. 9½d. (10) 90, 91, 92, 92; and £118 4s. 1½d.

D.

(1) £442 12s. 3½d. (2) £505 14s. 11½d. (3) £794 19s. 5½d. (4) 531·4886; when found by the true method the 4th decimal place is 8. (5) £93 10s. 10½d. (6) £267 5s. 1d.; £246 17s. 6d.; £8 0s. 4d.; 6s. 8d. (7) 16s. (8) £11 6s. 10½d. (9) £11 1s. 9½d. (10) £11 10s. 0d.

E.

(1) 13lbs., 10dwts., 20½ grs. (2) ·03493. (3) ⅓. (4) £6 7s. 6d. (5) £960 12s. 6½d. (6) £1811 19s. 9½d. (7) £11 14s. 10d. very nearly. (8) £22 2s. 6d. (9) 12 months (10) 1½; 5; 6; 7.

COLLEGE OF SURGEONS.

A

- (1) £15 6s. 3d. (2) 7 cwts. 1 qr. 6·92 lbs. (3) 3s. 6d.
(4) 25173. (5) £14 4s. 5½d. (6) 12½. (7) 6144. (8) 1187 lbs.
6 dwts.

B

- (1) 1 pint, 13 oz. 3 dr. 2 scr. 4 minns. (2) O.x. 3 vi, 3 ii,
3 ii, 10 minns. (3) £20 12s. 1d. (4) 504. (5) 4½. (6) 1½ days.
(7) 2s. 6d.; ·125. (8) 1s. 6d. (9) 17·1453394057. (10) £482 6s.
3½d.

C

- (1) 162½. (2) 225 210 330 122. (3) 12½; 1½. (4) 5375.
and 11s. 10·488d. (5) 4375; ·0044. (6) £49. (7) £16 7s.
1½d. (8) ·0992.

APOTHECARIES' HALL.

- (1) 8½. (2) 1·89 grains. (3) 2 fur. 36 per. 4 yds. 1 ft. 2½ in.
(4) ½. (5) 3·6785714 (6) £22s. 0s. 6½d. (7) 71½.
(8) £112 7s. 6½d.

NATIONAL SCHOOL RESULTS CARDS.

- A—(1) 688 guineas 5s. 1d.; £722 13s. 1d. (2) £2 7s. 6d.
(3) £4,713 1s. 1½d. (4) 2000. (5) 3,506,583,600. (6) 9, 1, 999.

- B—(1) £465 11s. 8d. (2) £1 8s. 11½d. (3) £3 7s. 6½d.
(4) £37 11s. 3½d. (6) 16.

- C—(1) 4095; 890. (2) 2736740. (3) 15,600. (4) £11 9s. 10½d.

- D—(1) £98 19s. 10½d. (2) 11s. 3d. (8) £1816 4s. 2½d.
(4) 4586. (6) 16s. 9½d.

- E—(1) 1s. 10½d. (2) £899 19s. 6½d. (3) £36 1s. 7½d.
(4) 9 times; 4d. (6) £5 14s. 2½d.

- F—(1) £364 1s. 1½d. (2) £1 11s. 1½d. (3) 1 acre, 3 roods,
29 perches. (4) £1 7s. 0½d. (5) 10 miles, 5 furlongs, 4 perches,
2 feet, 9 inches.

- G—(1) £531. (3) £125 8s. 5½d. (4) 11° 3' 14". (5) £2 0s. 3d.
(6) 200.

- H—(1) 96,054,984. (3) 1280. (4) £2 5s. (5) 13s. 1½d. (6) 18s.

- I—(1) £1 1s. 7½d. (2) £288 13s. 2d. (4) 1,745, remainder
15505. (5) 41. (6) £22,000.

- J—(2) 4058. (3) £7 6s. 8d. (4) £10 14s. 3½d. (5) 3 lbs.,
5 ozs., 13 dwts., 19 gra. (6) 28.

- K—(1) £398 5s. 10d. (2) 157 miles, 6 furlongs, 24 perches,
5 yards, 2 feet, 4 inches. (3) 5 cwt., 3 qrs., 19 lbs. (5)
£6 14s. 0½d. (6) 8½d.

- L—(2) £9029 8s. (3) 15 cwt., 25 lbs., 6 ounces. (4)
756 acres, 1 rood, 80 perches. (5) 7760. (6) 18s. 11½d.

- M—(1) 698. (2) 62. (4) £4718 (5) 280 acres, 2 roods,
10 perches. (6) £2 18s. 4d.

- N—(1) $8\frac{1}{4}$; $\frac{1}{4}$. (2) 749 days, 22 hours, 29', $23\frac{1}{2}$ ". (3) £26 2s. $2\frac{1}{2}$ d. (4) £211 2s. 2d. (5) .0246.
- O—(1) £20 10s. $7\frac{1}{2}$ d. (2) $23\frac{1}{4}$. (3) 5,488,560. (4) £43 11s. $7\frac{1}{2}$ d. (5) 1 acre, 1 rood, 4 yards, 5 feet, 91 inches.
- P—(2) .086. (3) 72 loads, 4 qrs., 3 bus., 2 pecks, 7 pints, 2 gills. (5) 3 loads, 4 qrs., 4 bus., 3 pecks, 1 gal., 4 pts. (6) 480; 437 $\frac{1}{2}$.
- Q—(1) £212 10s. 0d. (2) $1\frac{1}{4}$. (3) $12\frac{1}{2}$. (4) .27202. (5) 20.
- R—(1) £36 13s. 4d. (2) 286120. (3) £1 13s. 1 $\frac{1}{4}$ d. (4) $6\frac{1}{2}$. (5) $6\frac{1}{2}$.
- S—(1) 140. (3) Loss of £20. (4) 3s. $1\frac{1}{2}$ d. (5) $\frac{1}{16}$. (6) 1 $\cdot$ 372d.
- T—(1) £228 13s. 4d. (2) .067. (4) 15° $16'$ $44''$. (5) 50176. (6) £150.
- U—(2) 58 leagues, 1 mile, 7 furlongs, $34\frac{1}{2}$ perches. (3) 1000. (4) $14\frac{1}{2}$. (5) £100. (6) £160 5s. 3d.
- V—(1) $14\frac{1}{4}$ days. (2) 7005. (3) £35. (5) .00109375. (6) 1.09375.
- W—(1) 120. (2) £1010 16s. $11\frac{1}{2}$ d. (3) £7 10s. 0d., £6, £4. (5) £3 1s. (6) $2\frac{1}{2}$.
- X—(2) 3 roods, 17 perches, 10 yds. 3 ft. (3) £6480. (4) $\frac{1}{1000}$; .00390625. (5) $8\frac{1}{2}$. (6) $1\cdot414$; $1\cdot732$.
- Y—(1) £35 10s. 0d. (2) £16. (3) 12 days. (5) £3 17s. 6d. (6) .0296.
- Z—(1) .00836. (2) £3 1s. $11\frac{1}{2}$ d. (3) £1980 17s. 11d. (4) £5 1s. $11\frac{1}{2}$ d. (5) 196:121; 11:14; 175:144. (6) 7 acres, 3 roods.
- A¹—(1) £10 13s. $7\frac{1}{2}$ d. (3) .6123. (4) 28. (5) 290 acres, 12 perches, 23 yards. (6) 10s. $10\frac{1}{2}$ d.
- B¹—(1) £148 4s. $7\frac{1}{2}$ d. (2) $21\frac{1}{2}$. (3) .97.2. (4) 120. (5) £2 7s. $6\frac{1}{2}$ d.
- C¹—(2) 4.1819. (3) .3393; .1976. (4) 625 acres; 250 acres; 200 acres. (5) 14. (6) $27\frac{1}{4}$ past five.
- D¹—(1) 3 per cent. (3) 2 roods, 20 perches. (5) 7 cwt., 0 qrs. $4\frac{1}{2}$ lbs. (6) £32 11s.
- E¹—(1) 308. (2) 1562351. (3) 99. (5) Bank stock; £354 15s. (6) 378; 630.
- F¹—(1) 1099810. (2) 5. (3) 6.336. (4) 10. (5) $16\frac{1}{2}$ miles. (6) 20 mins.
- G¹—(1) £1 10s. 0d. (2) £19,200. (3) 192:175. (4) 16 lbs.; 16 lbs.; 80 lbs. (6) £4 10s. 0d.; £7 10s. 0d.
- H¹—(1) £150. (2) £27 6s. 11d. (3) 100s. (4) D, I₀; M, OI₀. (5) $4\frac{1}{2}$ d. (6) 12.
- I¹—(1) 53 acres, 3 roods, 27 perches. (2) 14. (4) £162 14s. 2d. (5) 17s. (6) 4.
- J¹—(1) .0069. (2) 6 acres, 33 perches, 29 yards, 2 feet, 62 inches. (3) $\frac{1}{2}$. (4) 27. (5) £122 10s. 0d.
- K¹—(1) .225. (2) £31 16s. $9\frac{1}{2}$ d. (4) 4 months. (5) 28 $\frac{1}{2}$ r. (6) 8s. $10\frac{1}{2}$ d.
- L¹—(1) £114 1s. 3d. (2) 10 per cent. gain. (4) £25 5s. 0d. (5) £2835 12s. 6d. (6) £425 8s. 10d.

CIVIL SERVICE ADDITION.

20 Lines.

5 Lines.			7 Lines.			10 Lines.			12 Lines.			15 Lines.		
£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
(1)	28838	3 9	29038	10 6½		30200	17 6		51207	3 11½		59834	0 6	(1)
(2)	62469	7 11½	64539	13 1½		763915	19 8½		764973	4 1		765413	7 8½	(2)
(3)	48540	5 9	61767	1 9½		127343	11 10½		138024	2 7		139699	5 4½	(3)
(4)	48888	10 2½	61611	8 0		71238	9 7½		656006	1 1½		7236281	1 2½	(4)
(5)	2685	18 11½	50503	6 4½		54923	18 4½		55944	14 8		56837	10 6½	(5)
(6)	13536	8 7½	13963	9 8½		984884	1 5½		1021500	10 0½		1025048	15 10	(6)
(7)	12652	17 1½	12962	14 8½		69043	3 9½		73174	0 1½		74303	14 4½	(7)
(8)	8580	0 0½	8686	12 3		59825	3 1½		68912	2 2½		72090	12 3½	(8)
(9)	4516	1 11	31826	0 4½		37508	11 7½		107016	17 11½		107880	3 1	(9)
(10)	1627	6 8½	6276	11 3½		63545	10 3½		143191	14 1		147080	3 2½	(10)
(11)	40578	5 11	44531	17 0½		72908	11 1½		74563	15 8½		79838	5 7	(11)
(12)	3518	3 4½	43263	2 6		141090	5 5½		146414	12 10½		151272	7 2	(12)
(13)	13343	9 0½	13272	14 5½		93954	8 0½		98736	8 8½		108789	1 5½	(13)
(14)	5516	19 0½	6080	17 9½		67284	4 0½		68160	6 10		68587	7 0½	(14)
(15)	8746	17 11	13135	3 8½		71366	7 7½		78747	14 11		80663	1 10½	(15)
(16)	8797	0 6½	87030	10 11½		41246	6 1½		117474	13 3½		121780	17 0½	(16)
(17)	4582	1 3½	10687	6 11½		10912	12 11½		69260	3 7		79092	4 7½	(17)
(18)	8467	17 9½	8517	2 5		50867	17 9½		51602	18 2½		52128	0 11½	(18)
(19)	2038	12 5	2413	6 10½		51091	12 11½		59189	17 0½		60318	19 1½	(19)
(20)	20475	8 1½	24858	8 8		77479	6 3½		127926	2 6½		133104	18 5½	(20)
(21)	9122	19 4	9619	9 0½		67047	18 6½		71143	9 1		74798	4 6½	(21)
(22)	4355	5 10½	5266	9 11		6485	1 3½		6508	13 3½		12072	5 8	(22)
(23)	11093	7 10½	11847	16 5½		69856	17 10½		73068	4 2½		73995	17 9½	(23)
(24)	2959	0 8½	7769	7 1½		66080	1 5½		68186	4 1½		68422	4 11½	(24)

CIVIL SERVICE ADDITION.

20 Lines.

	\$	s.	d.		\$	s.	d.
(1)	88,806,122	8	4	(15)	48,880,206	0	0
(2)	63,772,283	10	0	(16)	61,809,861	0	10
(3)	52,478,753	9	9	(17)	57,315,168	4	5
(4)	47,009,823	6	5	(18)	46,886,129	15	0
(5)	66,422,618	15	3	(19)	46,466,909	1	10
(6)	53,757,930	16	8	(20)	53,848,001	4	7
(7)	48,497,101	16	1	(21)	60,503,951	7	7
(8)	49,728,146	5	11	(22)	53,171,875	14	8
(9)	47,124,259	15	6	(23)	67,054,732	6	6
(10)	48,840,901	10	5	(24)	58,773,866	9	3
(11)	55,237,774	9	0	(25)	40,180,142	5	0
(12)	58,646,607	8	2	(26)	44,983,803	18	5
(13)	43,653,792	7	10	(27)	45,611,551	1	6
(14)	38,421,744	19	2	(28)	49,547,766	19	10

HORIZONTAL ADDITION.

(1) 312777. (2) 175787. (3) 272138. (4) 167773. (5) 174769. (6) 256769. (7) 258265. (8) 168993. (9) 177968. (10) 191326. (11) 237470. (12) 147211. (13) 140749. (14) 195502. (15) 205310. (16) 146042. (17) 171502. (18) 277768. (19) 175967. (20) 239327

ERRATA.

In question 1, page 70, the numbers were printed in the examination paper as here given. It is most likely, however, that 418-966 was given in mistake for 418-9666, as the latter gives an exact result.

Also in question 11, same page, the number 40101 ought, for a reason which will be obvious after solving, to be 110101, and this number has been adhered to in working for the answer.

ANSWERS

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J'.

- (1) 216 acres. (2) 25 per cent. (3) 792. (4) $\frac{1}{18}$. (5) 175 $\frac{1}{4}$ and 132 $\frac{1}{2}$. (6) 200 ozs. (7) 432432. (8) $7\frac{1}{8}$. (9) £15,600. (10) £105. (11) 5 per cent. (12) £59 2s. (13) $6\frac{1}{8}$ inches. (14) $\frac{1}{16}$ sq. inch. (15) $2\frac{1}{4}$ hours.

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K'.

- (1) a. $92\frac{1}{2}$; b. .026. (2) 2s. 6d. (3) 36 yards and 24 yards. (4) £ 376 s 0 s. (5) 25; 19. (6) $32\frac{1}{4}$ past 12 o'clock. (7) £700. (8) £30 7s. 6d. (9) $3\frac{1}{2}$ % are better by 5s. $5\frac{1}{4}$ d. (10) 1054.266 sq. yards. (11) 904.7808. (12) 2359 $\frac{1}{16}$ cubic feet. (13) 53° 6. (14) $22\frac{1}{2}$ feet.

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X'.

- (1) 1.263736. (2) $\frac{1}{12}$. (3) 28179+886 over. (4) .06031 and 156 $\frac{1}{11}$. (5) 8258 $\frac{1}{2}$ c. ft. and 774 sq. ft. (6) B, 80 hrs.; C, 64 hrs.; D, $76\frac{1}{2}$ hrs. and $17\frac{1}{4}$ hrs. (7) 2.8 in.; 9.4582 sq. in. (8) £22,666 13s. 4d. (9) 11:12. (10) 7.629. (11) £1,564. (12) £231 4s. 7d. increase. (13) Value of the estate = £4,875; the sons' shares = £1,625; £1,083 6s. 8d.; £866 13s. 4d.; and first daughter's = £780. (14) 4 ft. 2.7428 inches.

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Y'.

- (1) $1\frac{1}{4}$ d. (2) 4.3159. (3) 1995840 and 86. (4) .090909. (5) £1,750. (7) £450. (8) 750 men. (9) 100 gulden. (10) 16 feet 4 inches. (11) 66 apple trees, 44 pear, 12 plum, 42 cherry, and 28 walnut. (12) £13 16s. $0\frac{1}{4}$ d. gain. (13) 10.8913 and 7.03. (14) 60 miles; 7.30 a.m.; 1.30 p.m.; 2.22 $\frac{1}{2}$ p.m.; 8.30 p.m.; 5.30 p.m.

13

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